INDEPENDENT ORBITER ASSESSMENT

ASSESSMENT
OF THE
REACTION CONTROL
SYSTEM
Vol. 1 of 5

26 FEBRUARY 1988

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MCDONNELL DOUGLAS ASTRONAUTICS COMPANY HOUSTON DIVISION

SPACE TRANSPORTATION SYSTEM ENGINEERING AND OPERATIONS SUPPORT

WORKING PAPER NO. 1.0-WP-VA88003-12

INDEPENDENT ORBITER ASSESSMENT ASSESSMENT OF THE REACTION CONTROL SYSTEM FMEA/CIL

26 FEBRUARY 1988

This Working Paper is Submitted to NASA under Task Order No. VA88003, Contract NAS 9-17650

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Independent Orbiter Assessment Assessment of the Reaction Control System

1.0 EXECUTIVE SUMMARY

The McDonnell Douglas Astronautics Company (MDAC) was selected in June 1986 to perform an Independent Orbiter Assessment (IOA) of the Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL). Direction was given by the STS Orbiter and GFE Projects Office to perform the hardware analysis using the instructions and ground rules defined in NSTS 22206, Instructions for Preparation of FMEA and CIL, 10 October 1986.

The IOA effort first completed an analysis of the aft and forward Reaction Control System (RCS) hardware and electrical power distribution and control (EPD&C), generating draft failure modes and potential critical items. To preserve independence, this analysis was accomplished without reliance upon the results contained within the NASA FMEA/CIL documentation. The IOA results were then compared to the proposed post 51-L NASA FMEA/CIL baseline. This report documents the results of that comparison for the Orbiter RCS hardware and EPD&C systems.

The IOA product for the RCS analysis consisted of two hundred eight (208) hardware and two thousand sixty-four (2064) EPD&C failure mode worksheets that resulted in one hundred forty-one (141) hardware and four hundred forty-nine (449) EPD&C potential critical items (PCIs) being identified. A comparison was made of the IOA product to the NASA FMEA/CIL baseline as of 23 December 1987 which consisted of ninety-nine (99) hardware and five hundred twenty-four (524) EPD&C FMEAs, and sixty-two (62) hardware and one hundred forty-four (144) EPD&C CIL items. In order to facilitate comparison, additional IOA analysis worksheets were generated as IOA mapped one hundred sixty-six (166) hardware and required. five hundred ninety-seven (597) EPD&C FMEAs, and one hundred thirty-three (133) hardware and one hundred sixteen (116) EPD&C CILs and PCIs into the NASA FMEAs and CILs. After comparison of the IOA baseline to the NASA FMEA/CIL baseline and discussions with the NASA subsystem manager, ninety-six (96) hardware issues, eighty-three (83) of which concern CIL items or PCIs, and two hundred eighty (280) EPD&C issues, one hundred fifty-eight (158) of which concern CIL items or PCIs, remain unresolved. These three hundred seventy-six (376) issues can be grouped into three categories: NSTS 22206 interpretation differences, IOA failure modes not currently addressed on the NASA FMEA/CIL, and RCS subsystem analysis differences.

One hundred seven (107) of the unresolved EPD&C issues result because of differences in interpretation of NSTS 22206. The NASA/RI definition of redundancy allowed the selection of specific unrelated failures which were required to cause known problems, e.g., failures required to cause continuous power to a valve. The IQA redundancy string included only items that were also capable of performing the specific function of the item

being analyzed. IOA considers many NASA/RI redundancy strings to include multiple unrelated failures, thus making criticalities too severe or masking other critical failures found by IOA.

One hundred twenty-eight (128) of the unresolved hardware and EPD&C issues involve failure modes identified by IOA which are not currently addressed on the NASA FMEA/CIL baseline. IOA considers each of these failure modes to be credible, and recommends that they be added.

The remaining unresolved RCS issues result because of differences between the IOA and NASA/RI analyses of the RCS subsystem. of these issues are linked to a few general differences in the analyses performed by IOA and NASA/RI. For example, seventeen (17) of the FRCS hardware issues are linked to the fact that IOA considered the inability to deplete (dump) FRCS propellant to be critical for entry. NASA/RI considered it critical only for ET Six (6) of the ARCS hardware issues result because IOA considered any failure which resulted in the loss of primary thrusters to be a crit 1 during RTLS and TAL aborts due to the resulting reduced OMS and RCS propellant dump rates. Several of the RCS hardware issues are related to failures which result in propellant leakage. Per NSTS 22206, IOA considered any leakage of propellant to be critical, regardless of where it occurred. NASA/RI did not apply this philosophy to all propellant leakage failues. Fifty (50) of the unresolved EPD&C issues result because IOA considered the inability to determine the actual position of a valve to be a 3/2R. Loss of all redundancy could lead to falsely failing the valve closed, thus affecting mission operations. NASA/RI classified such failures as 3/3's. The remainder of the unresolved analysis-difference issues exist independently and cannot, for the most part, be linked to any general differences.

IOA recommends that the unresolved issues presented in this report be considered for incorporation into the NASA FMEA/CIL baseline.

Figures 1 and 2 present comparisons of the proposed post 51-L NASA hardware and EPD&C baselines with the IOA recommended hardware and EPD&C baselines, respectively, and associated issues.

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10A AND NASA TOTALS DO NOT INCLUDE FICS INSTRUMENTATION AND THERMAL CONTROL ITEMS. IOA ANALYZED AND ASSESSED THESE ITEMS AS EPDAC (TEMS. 1. MASA BASELINE AS OF 23 DECEMBER 1987.

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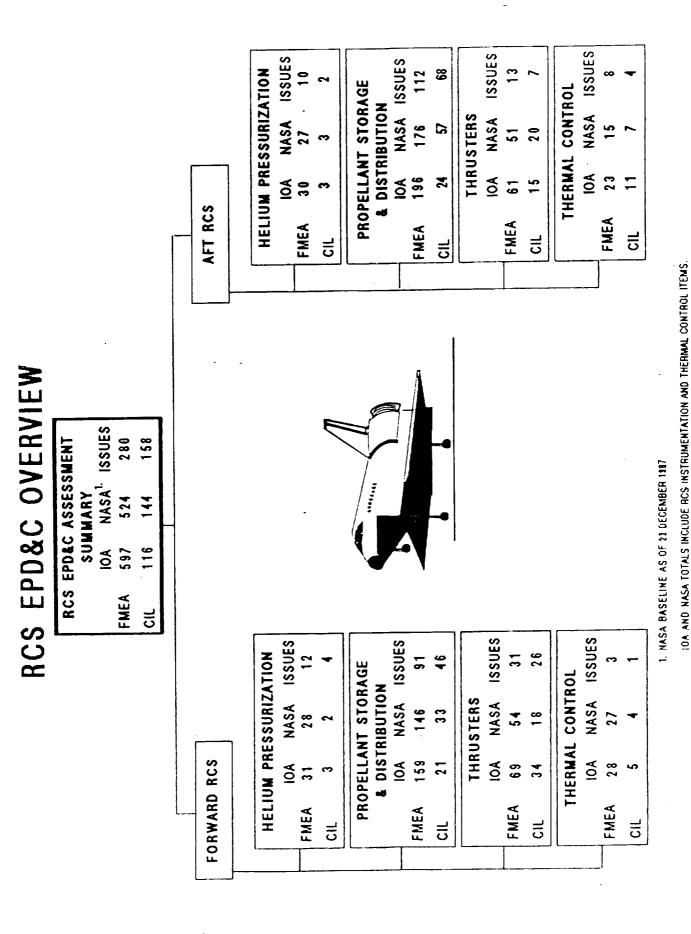
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Figure 2 - RCS EPD&C OVERVIEW

2.0 INTRODUCTION

2.1 Purpose

The 51-L Challenger accident prompted the NASA to readdress safety policies, concepts, and rationale being used in the National Space Transportation System (NSTS). The NSTS Office has undertaken the task of reevaluating the FMEA/CIL for the Space Shuttle design. The MDAC is providing an independent assessment of the Orbiter FMEA/CIL reevaluation results for completeness and technical accuracy.

2.2 Scope

The scope of the independent FMEA/CIL assessment activity encompasses those Shuttle Orbiter subsystems and GFE hardware identified in the Space Shuttle Independent FMEA/CIL Assessment Contractor Statement of Work. Each subsystem analysis addresses hardware, EPD&C, functions, internal and external interfaces, and operational requirements for all mission phases.

2.3 Analysis Approach

The independent analysis approach is a top-down analysis utilizing as-built drawings to divide the respective subsystem into components and low-level hardware items. Hardware and EPD&C items are evaluated for failure mode, effects, and criticality. These data are documented in the respective subsystem analysis report, and are used to assess the NASA and Prime Contractor FMEA/CIL reevaluation results. The IOA analysis approach is summarized in the following Steps 1.0 through 3.0. Step 4.0 summarizes the assessment of the NASA and Prime Contractor FMEAs/CILs which is documented in this report.

- Step 1.0 Subsystem familiarization
 - 1.1 Define subsystem functions
 - 1.2 Define subsystem components
 - 1.3 Define subsystem specific ground rules and assumptions
- Step 2.0 Define subsystem analysis diagram
 - 2.1 Define subsystem
 - 2.2 Define major assemblies
 - 2.3 Develop detailed subsystem representations
- Step 3.0 Failure events definition
 - 3.1 Construct matrix of failure modes
 - 3.2 Document IOA analysis results

Step 4.0 Compare IOA analysis data to NASA FMEA/CIL

- 4.1 Resolve differences
- 4.2 Review in-house
- 4.3 Document assessment issues
- 4.4 Forward findings to Project Manager

2.4 RCS Ground Rules and Assumptions

The RCS specific ground rules and assumptions used in the IOA analysis are presented in Appendix B.

3.0 SUBSYSTEM DESCRIPTION

3.1 Functional and Hardware Description

The Shuttle Orbiter includes three RCS packages, one forward and two aft, one in each of the left and right OMS/RCS pods (Figure 3). Each RCS package consists of the following subsystems:

- o Helium Pressurization
- o Propellant Storage and Distribution
- o Thruster
- o Electrical Power Distribution and Control

Figures 4 through 7 present an overview of the RCS breakdown hierarchy utilized in this analysis and assessment.

During a typical Shuttle mission, the RCS jets are used during External Tank (ET) separation, orbit insertion, orbital operations, deorbit maneuver, and entry. The Aft RCS (ARCS) is active from prelaunch through the transition to aerosurface control during entry. The Forward RCS (FRCS) is active from prelaunch through the post-deorbit propellant dump and is disabled for entry. Figures 8 and 9 are hardware schematics of the FRCS and ARCS, respectively.

The RCS jets are first used in the mission after Main Engine Cutoff (MECO) to maintain vehicle attitude until ET separation. The RCS provides a translation maneuver during ET separation to ensure Orbiter separation from the ET. The RCS is also used to control roll in the event of the failure of two main engines during ascent.

After OMS-1 burn cutoff, the vehicle goes into attitude hold. The crew uses the Translational Hand Controller (THC) to command RCS translational maneuvers to null any residual velocity. Attitude hold is maintained until the maneuver to OMS-2 burn attitude which is performed manually by the crew using the Rotational Hand Controller (RHC). The RCS +X jets can be used to complete either the OMS-1 or OMS-2 burns or to perform the OMS-2 burn entirely in the case of OMS engine failures. In this case, the OMS-to-RCS interconnect capability will be used to feed OMS propellant to the four +X RCS thrusters.

Once in orbit, after the OMS-2 burn is completed, RCS maneuvers are performed to control the vehicle attitude according to the flight plan. For onorbit attitude control the crew may select either primary or vernier jets.

During deorbit, the RCS is used to maneuver to the OMS deorbit burn attitude, null any residual velocity, dump excess propellant for center-of-gravity control, and maneuver to the Entry Interface (EI) attitude. In case both OMS engines malfunction, the RCS can be used to perform or complete the deorbit burn. In this case, the OMS-to-RCS interconnect will be selected to feed OMS propellant to the four +X RCS thrusters.

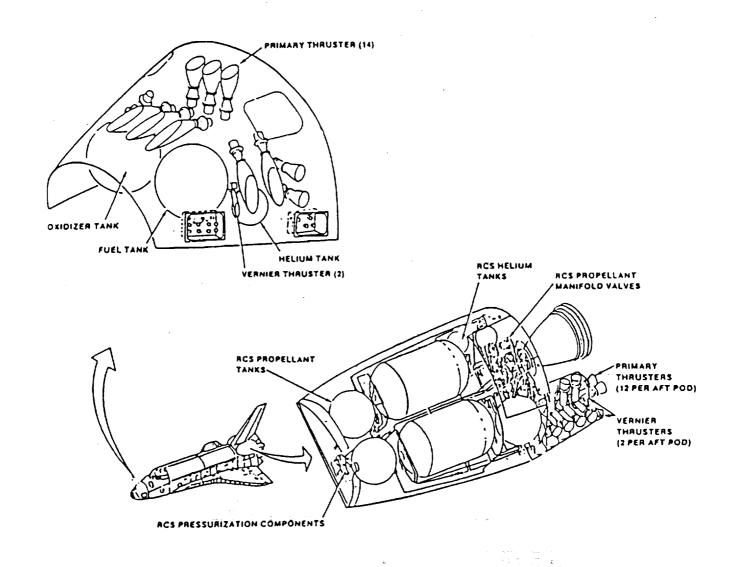


Figure 3 - REACTION CONTROL SYSTEM (RCS)

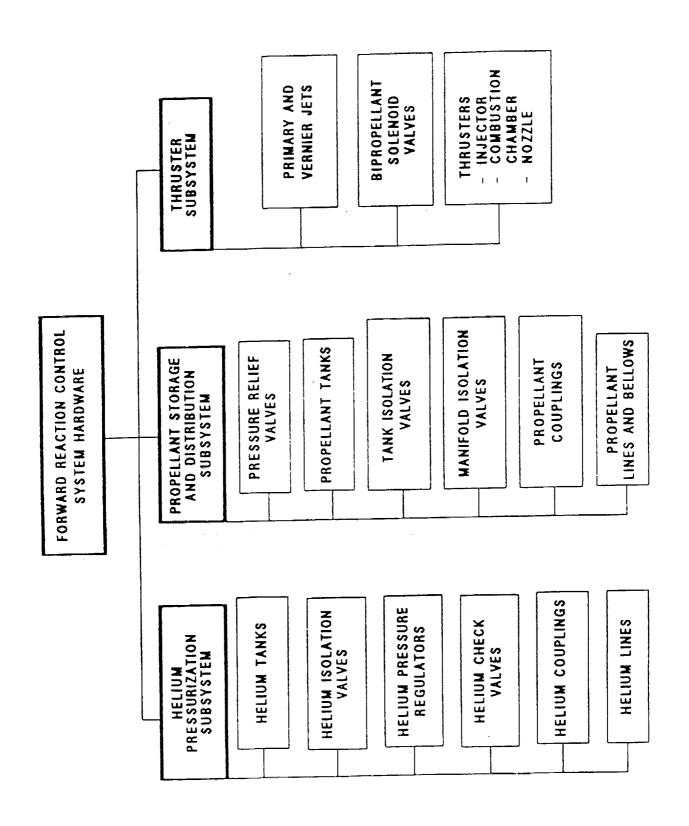


Figure 4 - FORWARD RCS HARDWARE BREAKDOWN HIERARCHY

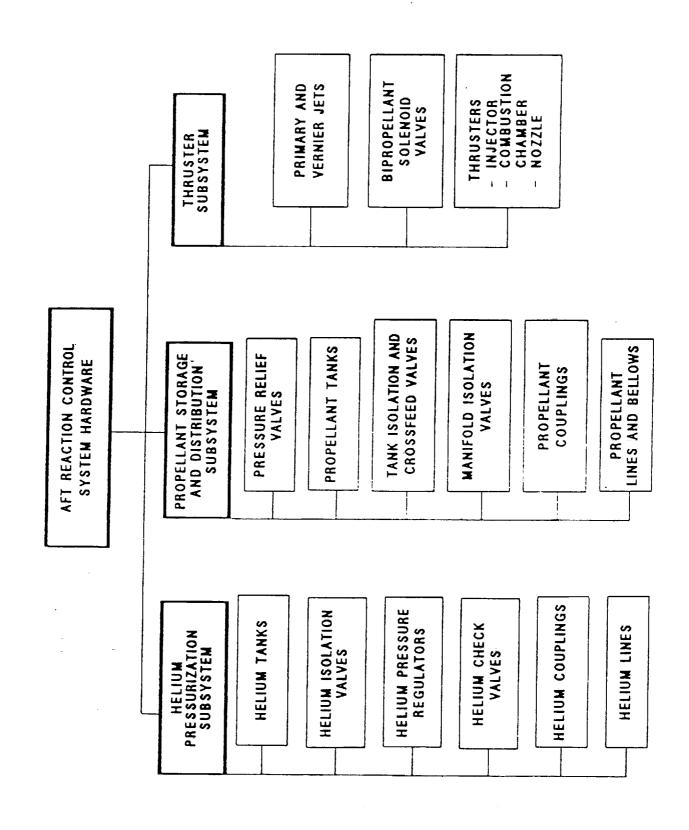


Figure 5 - AFT RCS HARDWARE BREAKDOWN HIERARCHY

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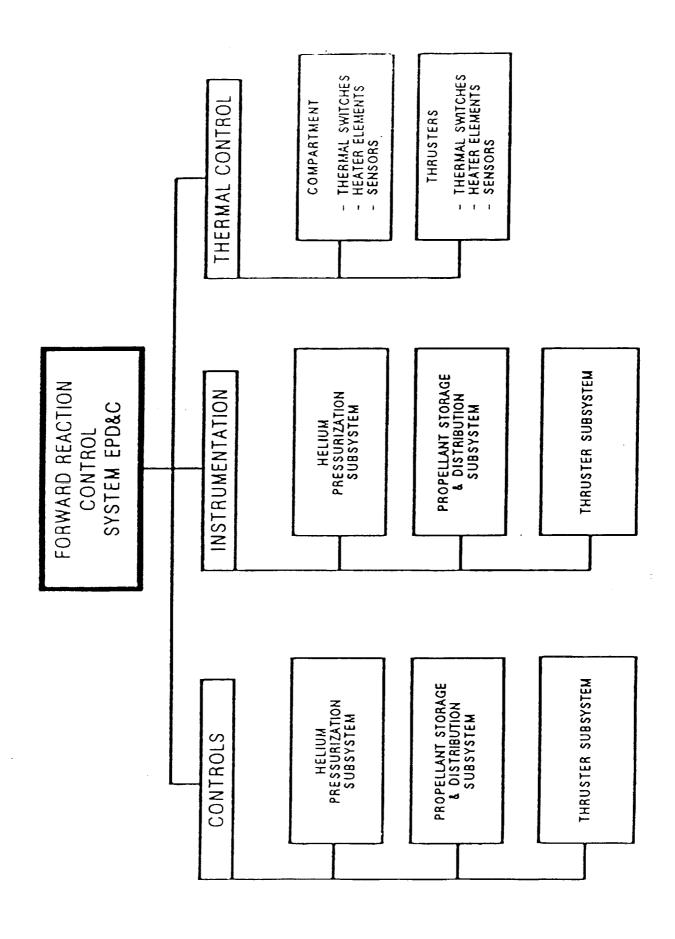


Figure 6 - FORWARD RCS EPD&C BREAKDOWN HIERARCHY

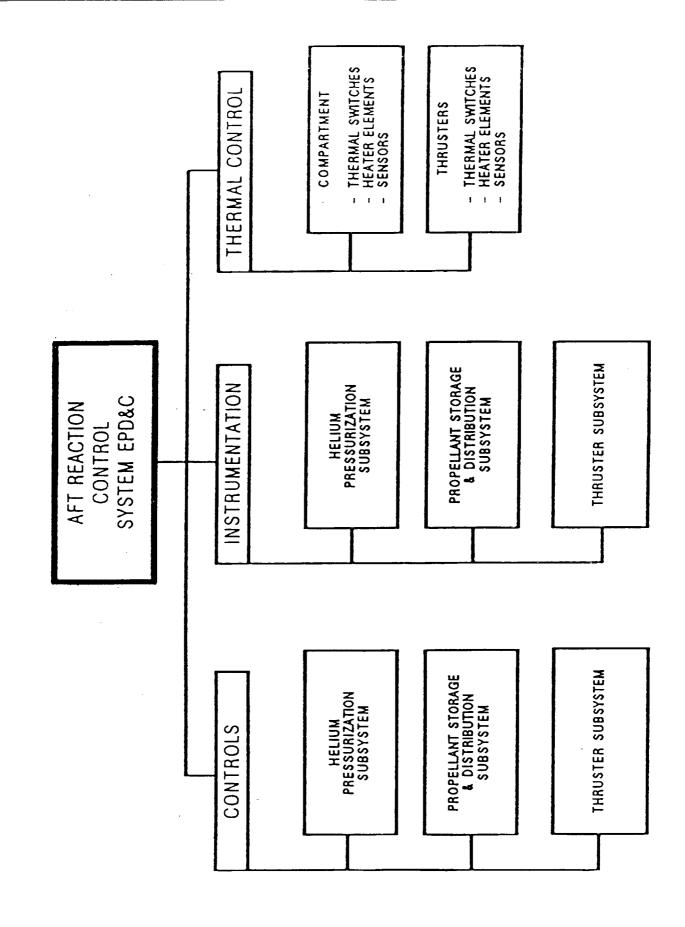


Figure 7 - AFT RCS EPD&C BREAKDOWN HIERARCHY

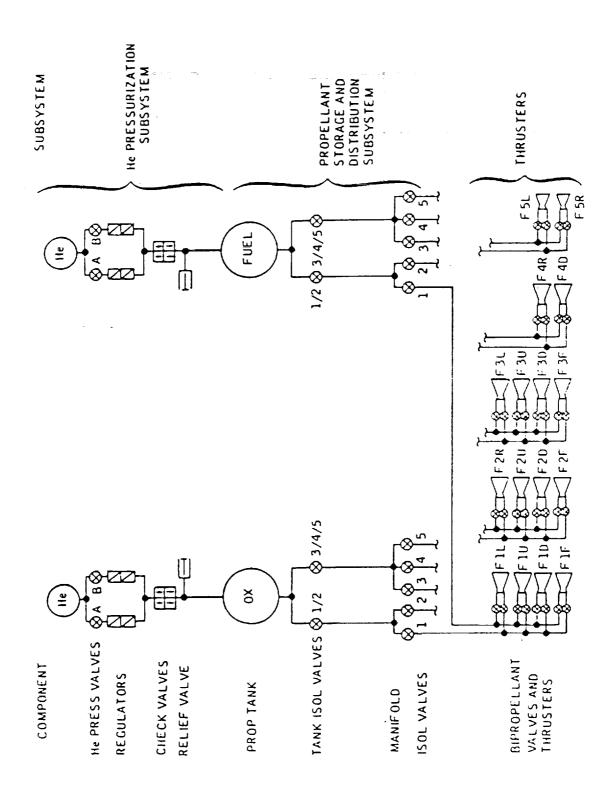


Figure 8 - FORWARD RCS SCHEMATIC

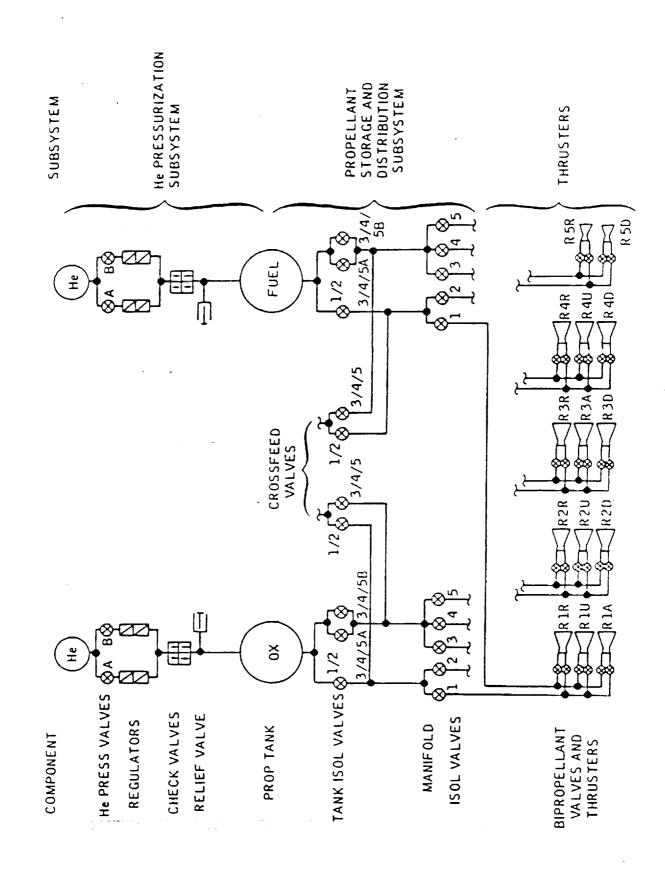


Figure 9 - AFT RCS SCHEMATIC

Once the deorbit burn is completed, the vehicle is maneuvered to the EI attitude.

From EI (400,000 ft) to approximately 262,000 ft, the vehicle is controlled in roll, pitch, and yaw with the ARCS jets. The GPCs disable the roll thrusters below this altitude, since the vehicle is captured and stable in the roll axis. Shortly after entering blackout, the pitch thrusters are disabled. From this time on, the elevons are used to control pitch and banking. The yaw thrusters are still used to assist the rudder. This mode of control will be used until the vehicle slows to Mach 1 where the yaw thrusters are disabled. Total vehicle control is then accomplished by the aerodynamic control surfaces through landing.

3.1.1 Helium Pressurization Subsystem

The pressurization subsystem regulates and distributes helium to the propellant tanks. This subsystem consists of two helium storage tanks, isolation valves, pressure regulators, check valves, and the lines necessary for filling, draining, and distributing the helium.

3.1.1.a Helium Storage Tanks

The high pressure helium supply is contained in two 1.761 cubic ft spherical storage tanks in each module. The tanks are made of a titanium liner overwrapped with fiberglass. One tank supplies helium pressure to the fuel propellant tank while the other helium tank supplies pressure to the oxidizer propellant tank. The helium tank's maximum operating pressure is 4000 psig and is proof-pressure tested to 4480 psig.

3.1.1.b Helium Isolation Valve

For each propellant there are two helium isolation valves in parallel between the helium tanks and the pressure regulators which are used to isolate the high-pressure gaseous helium from the remainder of the pressurization subsystem (Figure 10).

The helium isolation valves are operated by two solenoids, one of which is momentarily energized to magnetically latch the valve open. The second solenoid magnetically unlatches the valve, allowing spring and helium pressure to force the valve closed.

The switching logic for the helium isolation valves is contained in the Forward and Aft Load Control Assemblies (FLCA and ALCA). Solenoid and power logic is provided by the Power Control Assemblies (PCA), which are located within the LCAs. The LCAs and PCAs must be powered up in order to operate the helium isolation valves.

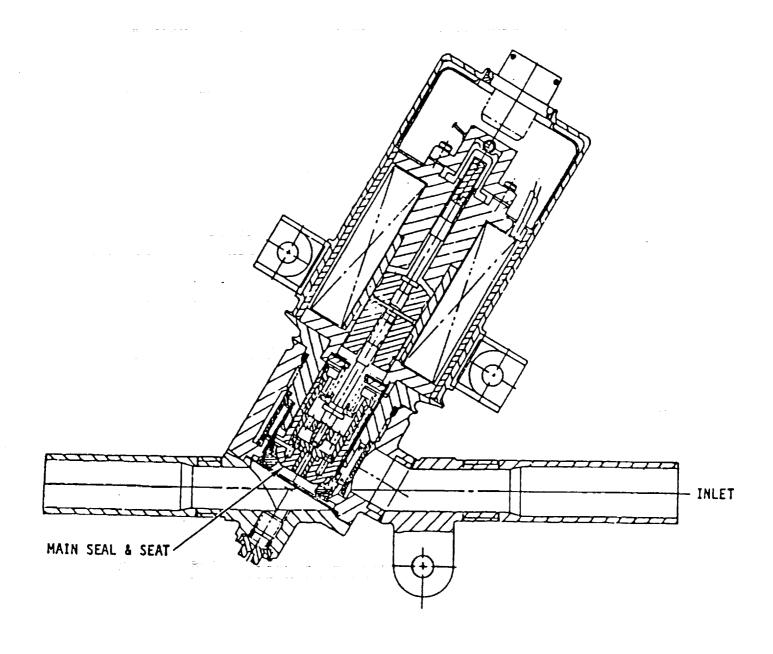


Figure 10 - HELIUM ISOLATION VALVE

The helium isolation valves are controlled by the FWD RCS, AFT LEFT RCS, and AFT RIGHT RCS HE PRESS A/B switches on panels O7 and O8. These are permanent position switches (OPEN, GPC, CLOSE), but only apply momentary power to the solenoid due to the logic in the LCA. Each switch controls two isolation valves, one in the helium oxidizer line and one in the helium fuel line.

These valves contain microswitches which are activated when the valves are fully open or closed. When commanded, the switch logic allows a one-second delay for the valves to reach the command position before sending a position indication signal to the GPCs, telemetry, and a position indicator (talkback) above each switch. Power is then removed from the solenoids. The talkback logic displays barberpole when the valves are in motion or when there is a position mismatch between the fuel and oxidizer helium valves. Otherwise, the talkback shows OP for open valves and CL for closed valves.

The GPC can command the isolation valve to open and close to maintain the system pressurization and to prevent overpressurization when the isolation valve switch is in the GPC position. In the event of a switch failure in the GPC position, the crew can open or close the valves using the GPC memory read/write procedures.

The valve's nominal operating pressure is 200 to 4000 psig and limits the flow to 81 scfm.

3.1.1.c Pressure Regulator Assembly

Helium pressure regulation is accomplished by two regulator assemblies connected in parallel and located downstream of each helium isolation valve (Figure 11). Each assembly contains two regulators, primary and secondary, connected in series so that if the primary regulator fails open, the secondary regulator can regulate the pressure within acceptable limits. The regulators cannot be controlled manually or by the GPC.

The primary and secondary regulators regulate the tank pressure to 245 psig and 256 psig, respectively. The flow rate is limited to 81 scfm for 500 to 1400 psig inlet pressure, and 150 scfm for 1400 to 4000 psig inlet pressure.

3.1.1.d Check Valve Assembly

A check valve assembly, located between the pressure regulator assemblies and each relief valve, is used to preclude backflow of helium or propellant vapors or

liquids (Figure 12). Each assembly contains four independent check valves connected in series-parallel. The check valves cannot be controlled manually or by the GPC.

The valve's normal operating pressure is 355 psig, with a maximum of 370 psig.

3.1.2 Propellant Storage and Distribution Subsystem

The propellant subsystem distributes the fuel and oxidizer to the thrusters. This subsystem consists of propellant tanks, pressure relief valves, tank isolation valves, crossfeed valves, manifold isolation valves, and the lines and couplings necessary for filling, draining, and distributing the propellant.

3.1.2.a Propellant Tanks

Each RCS module contains two titanium 39.2-inch spherical propellant tanks, one for fuel and one for oxidizer (Figure 13). Each tank contains an internally-mounted surface-tension screen Propellant Acquisition Device (PAD) which acquires and delivers the propellant to the RCS thrusters on demand. The surface-tension device also prevents the helium pressurant gas from entering the propellant or the propellant distribution lines prior to propellant depletion. The forward propellant tanks have PADs which are designed to operate primarily in a low-g environment. The aft propellant tanks are designed to operate in both high and low-g regimes.

3.1.2.b Pressure Relief Valve Assembly

The helium pressure relief valve assembly is located between each check valve assembly and the propellant tank, and will vent excess pressure overboard before it can over pressurize the propellant tanks (Figure 14). The assembly consists of a burst diaphragm, filter, and relief valve. The burst diaphragm is of the non-fragmentation type, but the filter is further insurance that fragmentation or particles will not reach the relief valve seat. The relief valve cannot be controlled manually or by the GPC.

The burst disk ruptures at 332 psig. The relief valve reseats at 310 psig.

3.1.2.c Tank Isolation, Crossfeed, and Manifold 1/2/3/4 Isolation Valves

The RCS propellant tank isolation, crossfeed, and manifold 1/2/3/4 isolation valves are all AC motor valves. Once a valve reaches the open or closed

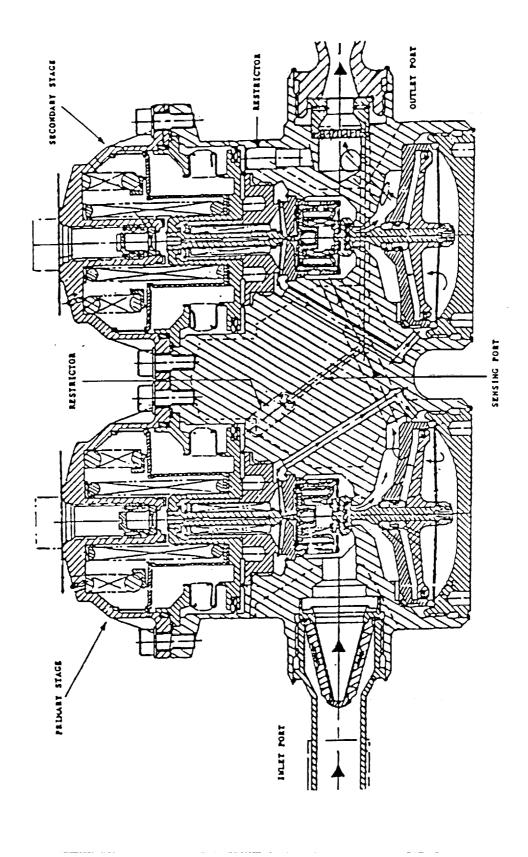


Figure 11 - HELIUM PRESSURE REGULATOR ASSEMBLY

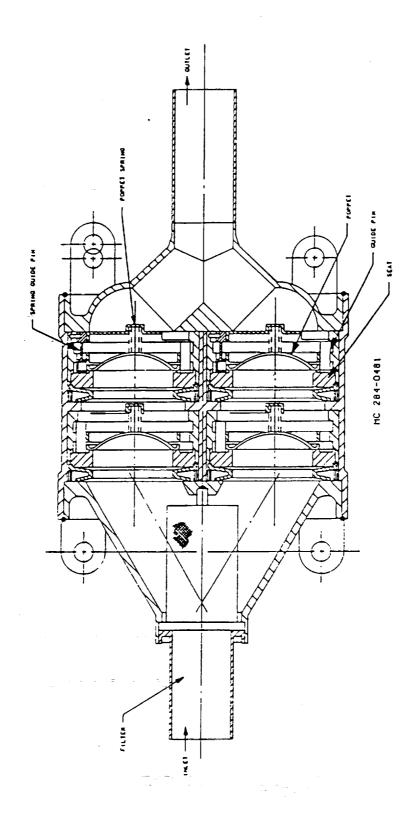


Figure 12 - QUAD CHECK VALVE ASSEMBLY

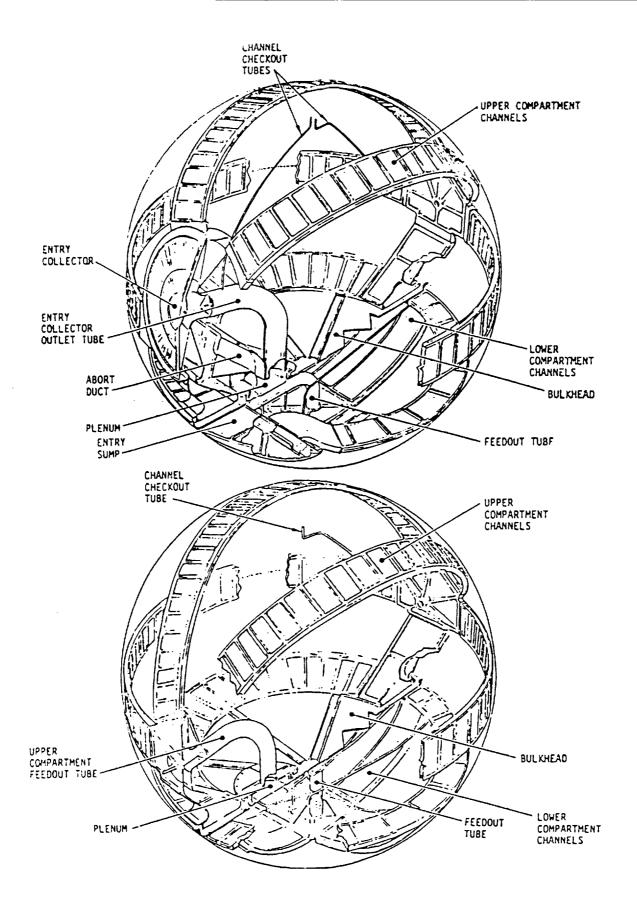


Figure 13 - AFT AND FORWARD RCS PROPELLANT TANKS

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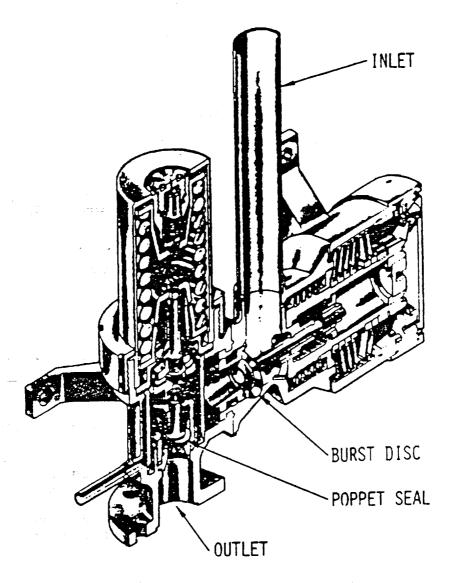


Figure 14 - PRESSURE RELIEF VALVE ASSEMBLY

position, an open or close microswitch is automatically activated to remove AC power from the valve motor. A signal is also sent to the GPC, to the ground, and to the valve position indicator (talkback), located above each switch. The talkback logic displays barberpole when the valves are in motion or when there is a position mismatch between the fuel and the oxidizer valves. Otherwise, the talkback shows "OP" for open valves and "CL" for closed valves.

The tank isolation valves are located between the propellant tanks and the manifold isolation valves, and are used to isolate the propellant tanks from the remainder of the subsystem (Figure 15).

The tank isolation valves are AC motor-operated and contain a lift-off ball-flow control device. For each module, one valve isolates each propellant tank from the 1/2 manifold. Two valves in parallel isolate each propellant tank from the 3/4/5 manifold line in the aft modules, and one valve isolates each propellant tank from the 3/4/5 manifold line in the forward module.

The tank isolation valves are controlled by the FWD RCS, AFT LEFT RCS, and AFT RIGHT RCS TANK ISOLATION 1/2 and 3/4/5 switches on panels 07 and 08. These are permanent position switches (OPEN, GPC, CLOSE). Switch logic, relay logic, and motor logic for the isolation valves are contained in the Forward and Aft Motor Control Assemblies (FMCA and AMCA). Therefore, it is necessary to have the MCAs powered up to operate the tank isolation valves.

The FRCS tank isolation valves are normally maintained open throughout the mission with the switch in the open position. The ARCS tank isolation valves are in the GPC position. With the switch in the GPC position, the logic in the MCA is designed to receive computer commands to control the valves. The GPC reconfigures the aft tank isolation valves and the RCS and OMS crossfeed valves in case of OMS-to-RCS interconnect, or for RCS/RCS crossfeed operations. Manual configuration is required in the case of manual RCS/RCS crossfeed and on orbit/deorbit OMS-to-RCS interconnect. In the event of a switch failure in the GPC position, the crew can open or close the valves using GPC memory read/write procedures.

The RCS crossfeed valves are contained only in the ARCS pods, and are used to isolate the RCS propellant crossfeed lines from the OMS interconnect lines (Figure 15). They are located between the tank isolation valves and the manifold isolation valves.

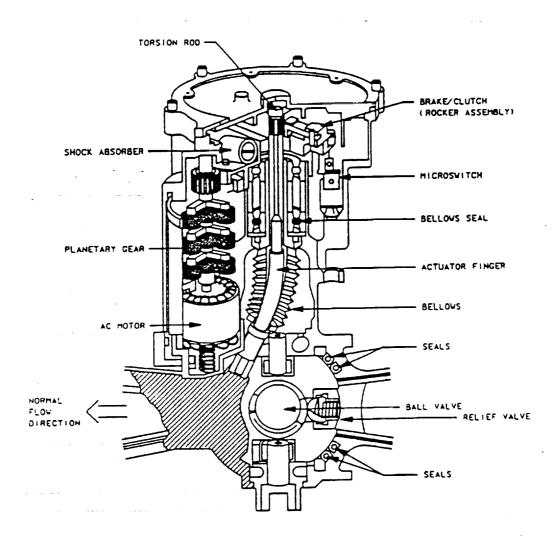


Figure 15 - AC MOTOR VALVE

The RCS crossfeed valves are AC motor-operated and contain a lift-off ball-flow control device. One pair of valves, one fuel and one oxidizer valve, isolate the RCS crossfeed lines from the 1/2 propellant lines. One pair of valves isolate the RCS crossfeed lines from the 3/4/5 propellant lines. The RCS crossfeed valves are

controlled by the LEFT, RIGHT RCS CROSSFEED 1/2 and 3/4/5 switches on panel 09. These are permanent position switches (OPEN, GPC, CLOSE). Switch logic, relay logic, and motor logic for the isolation valves are contained in the AMCA. Therefore, it is necessary to have the MCAs powered up to operate the RCS crossfeed valves.

The RCS crossfeed valves are normally maintained closed throughout the mission, with the switch in the GPC position. With the switch in the GPC position, the logic in the MCA is designed to receive computer commands to control the valves. The GPC reconfigures these valves, the OMS crossfeed valves, and the tank isolation valves in case of OMS-to-RCS interconnect during aborts, or for RCS/RCS crossfeed operations. Manual configuration is required in the case of manual RCS/RCS crossfeed and on orbit/deorbit OMS-to-RCS interconnect. In the event of a switch failure in the GPC position, the crew can open or close the valves using GPC memory read/write procedures.

The primary manifold isolation valves are located between the tank isolation valves, downstream of the RCS crossfeed valves, and the primary thrusters (Figure 15). They are used to isolate the primary thrusters from the propellant subsystem.

The primary manifold isolation valves are AC motoroperated and contain a lift-off ball flow control
device. For each module, one valve isolates each
manifold from each propellant. The primary manifold
isolation valves are controlled by the FWD RCS, AFT
LEFT RCS, and AFT RIGHT RCS MANIFOLD ISOLATION 1, 2, 3,
and 4 switches on panels 07 and 08. These are
permanent position switches (OPEN, GPC, CLOSE). Switch
logic, relay logic, and motor logic for the isolation
valves are contained in the FMCA and AMCA. Therefore,
it is necessary to have the MCAs powered up to operate
the manifold isolation valves.

Redundancy Management (RM) is used to monitor the microswitches in these valves, and can cause the valves to be declared closed, and the jets on that manifold to be removed from the Jet Available Table. The crew can override the RM by CRT keyboard entries and reselect the manifold and its jets.

The primary manifold isolation valves are normally maintained open throughout ascent and entry, with the switch in the GPC position. With the switch in the GPC position, the logic in the MCA is designed to receive computer commands to control the valves. These valves are controlled by the GPC during aborts and are controlled by RM at all times. In the event of a switch failure in the GPC position, the crew can open or close the valves using GPC memory read/write procedures.

3.1.2.d Vernier Manifold Isolation Valves

The vernier manifold isolation valves are located between the tank isolation valves, downstream of the RCS crossfeed valves, and the vernier thrusters (Figure 16). They are used to isolate the thrusters from the propellant subsystem.

The vernier manifold isolation valves are DC solenoid operated. One valve isolates each vernier manifold from each propellant. The manifold isolation valves are controlled by the FWD RCS, AFT LEFT RCS, and AFT RIGHT RCS MANIFOLD 5 ISOLATION switches on panels 07 and 08. These are momentary position switches (OPEN, GPC, CLOSE). Switch logic for the vernier manifold valves is contained in the FLCA and ALCA. Solenoid logic and power logic is provided by the Power Control Assemblies (PCAs). Therefore, it is necessary to have the LCAs powered up to operate the manifold isolation valves.

The circuitry to control the valve has been changed since 51-L (Figure 17). The switches have been changed from permanent position switches to momentary switches. To prevent effects of an internal short in the switch, diodes have been added to direct the current to ground (thus blowing the associated fuse). A circuit breaker and a Type IV hybrid driver have been added for additional circuit control. The driver can receive commands from either the switch panel or the GPC. These changes have been implemented to prevent continuous power from being applied to the solenoids. Continuous power to these solenoids have been found to cause valve overheating thus fuel decomposition leading to valve rupture and propellant release.

Once a valve reaches the open or closed position, a microswitch is automatically closed to remove DC power from the valve solenoid. A signal is also sent to the GPC, to the ground, and to the valve position indicator (talkback) located above each switch. The talkback logic displays barberpole when the valves are in motion or when there is a position mismatch between the fuel and the oxidizer valves. Otherwise, the talk-

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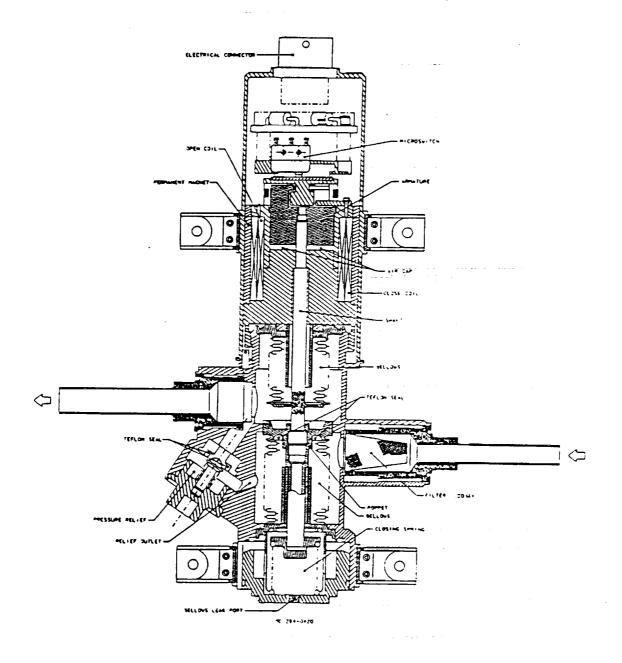


Figure 16 - VERNIER MANIFOLD ISOLATION VALVE

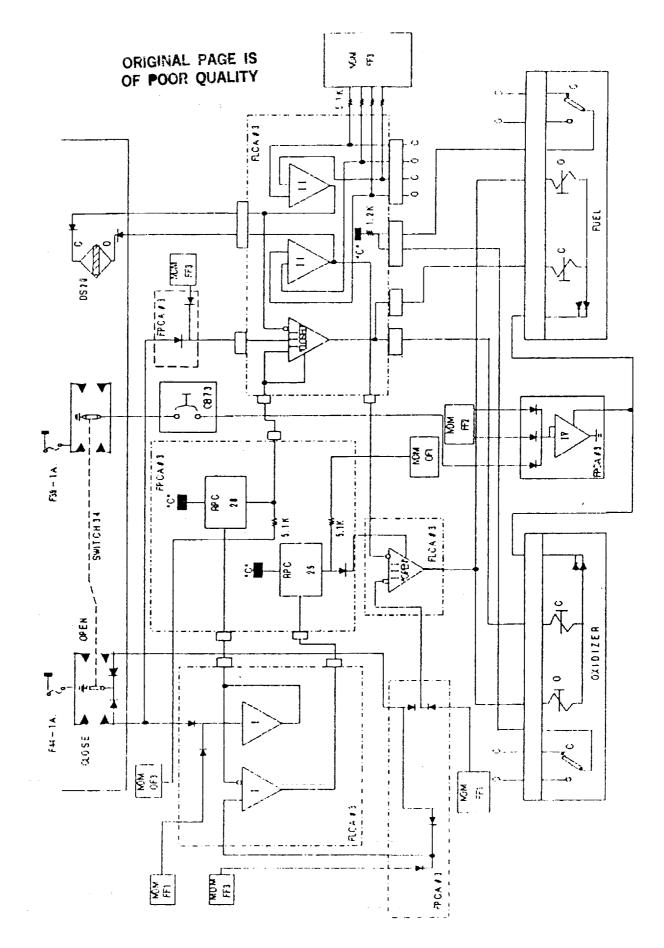


Figure 17 - MANIFOLD 5 ELECTRICAL SCHEMATIC

back shows "OP" for open valves and "CL" for closed valves. Redundancy Management (RM) is used to monitor the microswitches in these valves, and can cause the valves to be declared closed, and the vernier jets to be deselected. The crew can override the RM by CRT keyboard entries and reselect the vernier jets.

The vernier manifold isolation valves are normally maintained open throughout orbit and closed during ascent and entry, with the switch in the GPC position. With the switch in the GPC position, the logic in the LCAs and PCAs is set up to receive computer commands to control the valves. The GPC controls these valves by RM at all times. In the event of a switch failure in the GPC position, the crew can open or close the valves using the GPC memory read/write procedures.

3.1.3 Thruster Subsystem

The RCS jet thrusters are pressure-fed, bipropellant, hypergolic engines. There are two types of thrusters in the Shuttle: the primary thrusters, and the vernier thrusters (Figure 18). Both types of thrusters contain a fuel and oxidizer bipropellant solenoid valve, injector head assembly, combustion chamber, expansion nozzle, and an electrical junction box and can be operated in either pulse mode or steady-state mode.

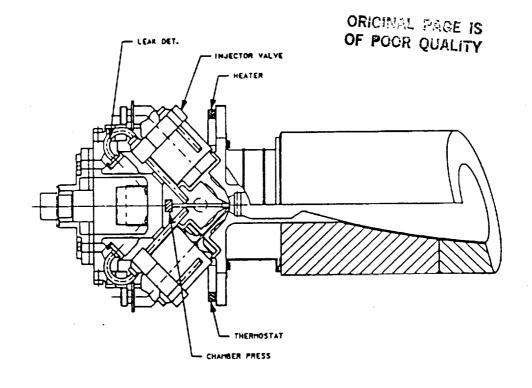
3.1.3.a Bipropellant Valves

The bipropellant control valves control the flow of propellants to the thrusters by opening and closing in response to electrical fire commands (Figure 19). Each primary jet engine assembly contains two injector solenoid pilot poppet valves, one for fuel and one for oxidizer. They are operated by coaxially-wound coils which are energized open by a fire command, and are spring-loaded closed. When the pilot valves open, the propellant's hydraulic pressure opens the main poppet valves to allow the propellants into the injector. The vernier jets use single-stage, solenoid-operated poppet valves.

The fuel and oxidizer valves on the primary jet thrusters are mechanically linked. The pilot valve is activated by a 80 msec pulse sent from the Reaction Jet

Driver. Commands are issued every 80 msec, so the minimum on or off time is 80 msec. The vernier bipropellant valves are operated similarly by a mechanically linked torque motor.

During normal operations, if the isolation and manifold valves are properly configured, a fire command to a jet



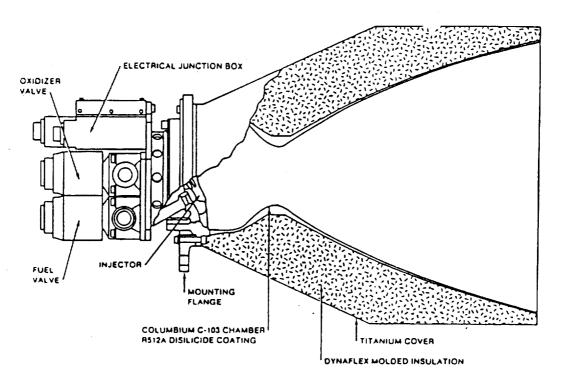
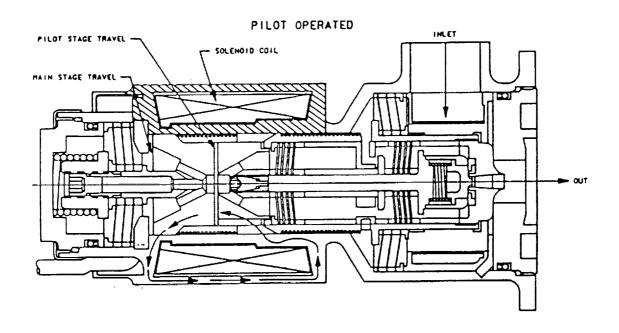


Figure 18 - VERNIER AND PRIMARY THRUSTERS



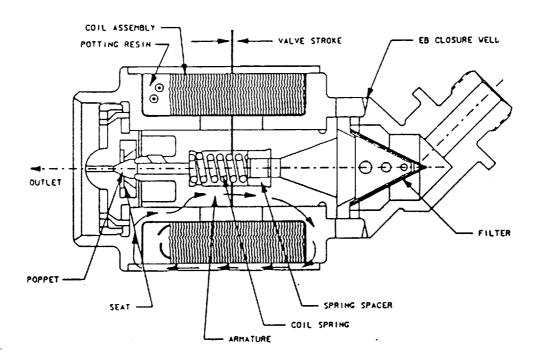


Figure 19 - PRIMARY AND VERNIER THRUSTER VALVES

will cause that jet's bipropellant valves to open. Removal of the fire command will cause the bipropellant valves to close.

3.1.3.b Injector Head Assembly

Each RCS jet contains an injector head assembly which directs the propellant flow from the bipropellant control valves to the combustion chamber (Figure 20). The injector is welded to the combustion chamber.

For the primary jets, injector holes are arranged in two concentric rings (outer fuel, inner oxidizer) which are canted to cause impingement of the hypergolic propellants within the combustion chamber. Separate fuel holes near the outer edge of the injector plate provide cooling for the combustion chamber wall. Spaced between these fuel inlet holes are acoustic cavities which are of varied depth to prevent acoustic resonance when the jet is fired.

For the vernier jets, fuel and oxidizer enter the combustion chamber through a single pair of injector holes which are also canted to provide impingement of the fuel and oxidizer streams for combustion. The combustion chamber wall is cooled by making the fuel stream more divergent than the oxidizer stream.

Unlike stream impingement is used to improve propellant mixing in the combustion chamber with a mixture ratio of 1.6 lbs oxidizer to 1.0 lbs fuel for both the primary and vernier jets.

The primary jets operate at 152 psia, produce 870 lbs (vacuum) thrust, and have a specific impulse of 280 seconds. The vernier jets operate at 106 psia, produce 25 lbs (vacuum) thrust, and have a specific impulse of 265 seconds.

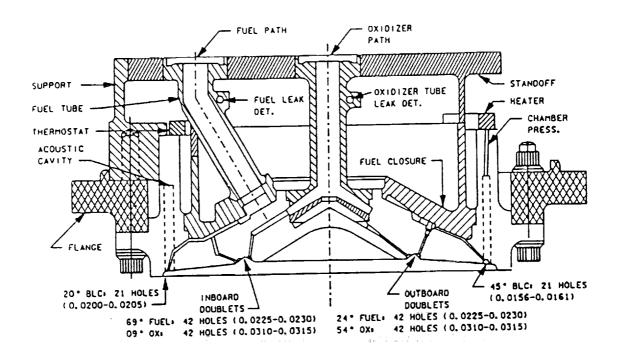
3.1.3.c Combustion Chamber and Nozzle

The combustion chamber and nozzle are made of columbium C-103 with a R512A Disilicide coating 0.003-inches thick. Behind the columbium is Dynaflex molded insulation covered with 0.02-inch thick titanium on the outside.

3.1.4 Electrical Power Distribution and Control Subsystem

3.1.4.a Electrical Junction Box

The electrical junction box on each RCS thruster contains an electric heater and thermostat, a chamber pressure transducer, a propellant leak detection



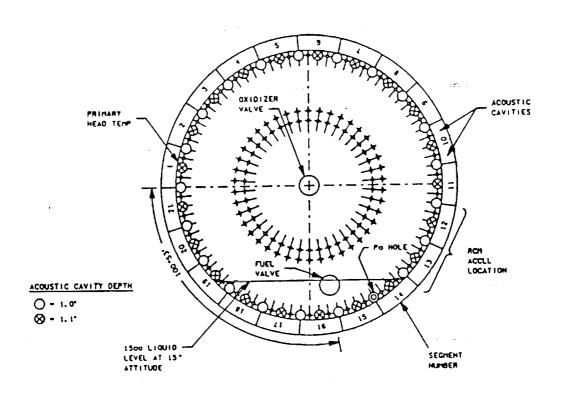


Figure 20 - INJECTOR HEAD ASSEMBLY

device, and the electrical connections to the bipropellant valves. The electrical heater contains one heating element and is thermostatically controlled.

The thermostat is set to a predetermined range, and will regulate the on and off cycles of the heater as

long as voltage is present. The heaters are controlled by the RCS/OMS HEATERS switches on panel A14. These are two-position switches, OFF and AUTO, and the heater is controlled by the thermostat when this switch is in the AUTO position.

3.2 Redundancy Management

The RCS Redundancy Management (RM) monitors the RCS jets' chamber pressures, temperatures, reaction jet driver output discretes and jet fire commands, and manifold valves status. It also provides a limited amount of automatic jet deselection and alerts the crew when a fault is detected.

The Data Processing System (DPS) software provides status information on I/O errors to the RCS RM software, referred to as commfaults (communications faults). Commfault indicators are set as the result of bus masking, Bus Control Element (BCE) bypasses, and Bus Terminal Unit (BTU) bypasses. When an I/O error is detected on a BCE chain by any GPC, the data on the entire chain is flagged as invalid (commfaulted) for the applications software. On subsequent transactions, if the problem is isolated, only the faulty element is flagged as invalid. In a similar way, if a bus mask is set all BCEs and data associated with that bus is indicated via commfault as being in error. In any case, the commfault will be set or latched when it is present for two consecutive passes.

Commfaults are included in the RCS RM requirements to help prevent the redundant GPCs from moding to dissimilar software, to optimize the number of jets available for use, and to prevent the RCS RM from generating additional alerts to the Flight Control Operational Software (FCOS) generated alerts associated with commfaults. The RCS RM uses the MDM and Line Replaceable Unit (LRU) commfaults (where LRU is defined to be either one RCS jet or one RCS manifold), and will reconfigure for commfaults, regardless of whether the commfault is permanent, permanent and subsequently removed, or transient. The MDM and LRU commfaults are set in the FCOS software when a commfault is present for two cycles. There are 44 jet LRU commfaults and 15 manifold LRU commfaults.

All input signals associated with any one LRU (where LRU is defined as either one RCS jet or one RCS manifold) will be within the same BCE, and the FCOS will set a BCE flag for a BCE if it determines an I/O problem at the BCE level. This flag will be used by the manifold status monitor in determining the commfault state of the RCS LRU, and/or input signals for the LRU. A jet

with an LRU commfault will not have any of its status flags or counters modified as long as the fault exists, except by subsequent crew action. An MDM commfault will set all LRU commfaults for each BCE associated with the MDM commfault, thus suspending the operation of the RCS RM failure monitors. An I/O reset on a CRT keyboard will reset any latched commfaults. LRU commfaults or transducer failures will cause the quantity monitor to use substitute measurements or constants, and the CRTs will shown on "M" to indicate missing data. If a substitute is not available or a constant is used, the calculations are suspended, a down arrow appears on the CRT, and a class 3 alarm is output.

All input signals associated with an LRU are required to be within the same BCE. The input signals associated with each RCS jet are a chamber pressure discrete, fuel and oxidizer injector temperatures, and reaction jet driver output discrete. The input signals associated with each manifold are the open and close discretes for the fuel and oxidizer manifold isolation valves.

3.2.1 Jet Failed-On Monitor

The Jet Failed Monitor uses the Reaction Jet Driver (RJD) output discretes and the jet fire command discretes provided by the RCS CMD SOP to detect jets failed on.

The Jet Failed-On Monitor uses the jet fire command A discretes, the reaction jet driver output discretes, the jet RM inhibit discretes, and the jet LRU commfault discretes as inputs, and outputs the jet failed-on indicator discretes and the jet failed on counter discretes. There are 44 of each of these discretes.

The Jet Failed-On Monitor's logic ANDs the reaction jet driver output discrete with the complement of the jet fire command A discrete, and declares the jet failed-on if this calculation is true for three consecutive cycles. Consecutive passes are not affected by commfaults or by cycles in which there are fire commands for the affected jets. The three consecutive cycle logic will be reset; however, if the noncommanded jet has its reaction jet driver output discrete reset to indicate the jet is not firing. A jet failed-on declaration will not cause automatic deselection of the jet by RM, nor will the Digital Autopilot (DAP) reconfigure the Jet Priority Table.

A jet failed-on determination will set the jet failed-on indicator discrete and the jet failed-on counter discrete. These discretes will be reset when the associated jet's RM inhibit discrete is reset. The Jet Failed-On Monitor outputs the jet failed-on indicators to displays and controls and to the Jet Fault Limit Module.

The Jet Failed-On Monitor's design is valid for a minimum jet fire command pulse of 80 msec on and 80 msec off. The crew will be alerted by a class 2 alarm, the backup C&W

lights and RCS jet light on the C&W matrix on panel F7, a fault message on the CRT fault message line, and jet-on indications on the RCS SPEC display and the GNC SYS SUM 1 and 2 displays.

The Jet Failed-On Monitor is active in OPS 1, 2, 3, 6, and 8 in the PASS, and 1, 3, and 6 for the BFS, but only if BFS is engaged.

3.2.2 Jet Failed-Off Monitor

The Jet Failed-Off Monitor uses the jet fire command discretes provided by the RCS Command SOP, and the jet chamber pressure feedback discretes provided by the RJDs to detect jets failed off.

The Jet Failed-Off Monitor uses the jet fire command A discretes, the jet chamber pressure discretes, the jet RM inhibit discretes, and the jet LRU commfault discretes as inputs, and outputs the jet failed-off indicator discretes and the jet failed-off counter discretes. There are 44 of each of these discretes.

The Jet Failed-Off Monitor's logic ANDs the jet fire command A discrete with the complement of the jet chamber pressure discrete, and declares the jet failed off if this calculation is true for three consecutive cycles. Consecutive passes are not affected by commfaults or by cycles in which there are no fire commands for the affected jets. However, consecutive passes leading to a failed-off indication must begin anew if, prior to reaching the third consecutive cycle, the fire command and its associated pressure discrete indicates that the jet has fired. The RCS RM will automatically deselect a jet which has failed off, and the DAP will reconfigure jet selection accordingly. (See section 3.6.1 for the DAP Jet Select Logic description.)

A failed-off jet determination will set the associated jet failed-off indicator and the jet failed-off counter discretes. These discretes will be reset when the associated jet's RM inhibit discrete is reset. The Jet Failed-Off Monitor outputs these jet failed-off indicator discretes to the Jet Fault Limit Module and to displays and controls. The Jet Failed-Off Monitor will be inhibited for the jet which has failed off until the crew resets the RM inhibit discrete.

The Jet Failed-Off Monitor design is valid for a minimum jet fire command pulse mode of 80 msec on and 80 msec off. The crew is alerted to a failure by a class 2 alarm, the backup C&W light and RCS jet light on the C&W matrix on panel F7, a fault message on the CRT fault message line, and a jet-off indication on the RCS SPEC display and the GNC SYS SUM 1 and 2 displays. The Jet Failed Off Monitor is active in OPS 2, 3, 6, and 8 in the PASS, and 1, 3, and 6 for the BFS, but

only if BFS is engaged.

3.2.3 Jet Leak Monitor

The Jet Leak Monitor uses the jet fuel and oxidizer injector temperature transducer outputs of each jet to detect a leaking jet.

The Jet Leak Monitor uses the jet fuel and oxidizer injector temperatures, the jet RM inhibit discretes, and the jet LRU commfault discretes as inputs, and outputs the jet failed leak indicator discretes and the jet failed leak counter discretes. There are 44 of each of these discretes.

The Jet Leak Monitor's Logic compares the jet fuel and oxidizer injector temperatures with the specified temperature limit of 30 degrees F, and declares the Jet Failed Leak if either of the temperatures are less than 30 degrees F for three consecutive cycles. Consecutive passes leading to a Jet Failed Leak indication will begin anew if the fuel and oxidizer temperatures are both greater than 30 degrees F before the jet leak counter reaches three. The RCS RM will automatically deselect a jet which is declared leaking and the DAP will reconfigure jet selection accordingly.

A Jet Failed Leak determination will set the associated jet failed leak indicator and jet failed leak counter discretes. These discretes will be reset when the associated jets RM inhibit discrete is reset. The Jet Leak Monitor outputs the Jet Failed Leak indicator discretes to the Jet Fault Limit Module and to crew displays.

The crew is alerted to a failure by a class 2 alarm, the backup C&W light and the RCS jet light on the C&W matrix on panel F7, a fault message on the CRT fault message line, and a Jet Failed Leak indication on the RCS SPEC display and the GNC SYS SUM 1 and 2 displays.

The Jet Leak Monitor is active in OPS 2, 3, and 8 for the PASS, and 1, 3, and 6 for the BFS, but only if BFS is engaged.

3.2.4 Jet Fault Limit Module

The Jet Fault Limit module limits the number of jets which can be automatically deselected in response to failures detected by RCS RM. The limits are modifiable by crew input on the RCS SPEC display (RCS F, L, R Jet Fail Limit integers - one integer per pod). This module also reconfigures a jet's availability status (jet deselect output discretes (44)) in response to crew inputs on the RCS SPEC display (jet RM inhibit discretes (44) and jet deselect input discretes (44)).

An automatic deselection of a jet occurs if all of the following are satisfied:

- Jet Failed-Off or Jet Failed Leak (Jet Failed-On failures do not result in automatic deselection)
- Jet select/deselect status is "SELECT"
- o Jet's manifold status is "OPEN"
- o RM is not inhibited for this jet
- o Jet failure has not been overridden
- o The number of automatic deselections of primary jets on this pod is less than the associated Jet Fail Limit (no limit on vernier jets)

All jet failures detected will be announced to the crew even if they do not cause automatic jet deselection. If multiple failures occur on a jet, only the last failure will be annunciated. Failure indicators are the same as in the Jet Failed Off and Jet Failed Leak Monitors.

The jet fail limit counter is incremented by the number of jets which have been automatically deselected for that pod by the RCS RM and is decremented by one for each automatically deselected jet that is reselected. The vernier jets do not increment or decrement the jet fail limit counter. The Jet Fail Limit valves are individually changeable in major modes 2 and 3 on the RCS SPEC display. An increase in the Jet Fail Limit allows previously failed jets to be deselected, providing the above requirements are met. A decrease in the Jet Fail Limit will not cause a change in the status of any jet. Note that setting the Jet Fail Limit equal to or less than the number of jets which have been automatically deselected will effectively inhibit the RCS RM for that pod.

A jet's status can be changed from deselect to select only by item entry on the RCS SPEC page. Failure resets or reductions in the Jet Fail Limit will not cause the status to be reset to select. The select item entries cause the override to be invoked if there is a declared failure for that jet, and will make those failures inoperative in the Jet Fault Limit module. An overridden failure will remain overridden until the applicable failure is reset.

Automatic deselection of a jet can be prevented by the use of the Inhibit item entries on the RCS SPEC page. Changing the Inhibit to Not Inhibited will reset a jet's failures, but will not cause the Jet Fail Limit to be incremented or decremented. Reset by use of the RM Inhibit of a failure which has been overridden will reset the override. Jet failures are unordered; that is, if there are more candidates for automatic deselection than is permitted by the Jet Fail Limit, there is no preference as to which of the candidates will be deselected.

3.2.5 Manifold Status Monitor

The Manifold Status Monitor uses the open and close discretes of the oxidizer and fuel manifold isolation valves (provided by the monitor control assemblies) to determine the open/close status for each jet manifold.

The Manifold Status Monitor uses the fuel and oxidizer manifold valve open discretes (15 of each discrete), the fuel and oxidizer close discretes (15 of each), the manifold status discrete (15 discretes), the manifold LRU commfault discretes (15 discretes), the MDM commfault discretes (8 discretes), and the manifold status override discrete (one discrete) as inputs, and outputs the manifold open/close status discretes (15 discretes), the RCS manifold RM dilemma discretes (15 discretes), and the RM power fail discrete (one discrete).

The Manifold Status Monitor monitors the open and close discretes for each manifold for any changes of state. A change of state in any one or more of these discretes will cause a redetermination of that manifold's open/close status, independent of status changes made by the crew. This redetermination also contains logic which will determine if a power failure has occurred and will determine whether a dilemma exists on a manifold (tables 3-I and 3-II). A power failure condition exists when all of the open and close discretes on a manifold are false for three consecutive cycles, and will cause the RM Power Fail Flag to be set. The manifold sets identified in Table 3-II are the only manifolds which require power failure determination. This flag will remain set until the GNC FDA module honors it, when it will then be reset. There is only one RM Power Fail Flag and all manifolds are capable of setting it, but each can set the flag only once. Whenever a dilemma exists for three consecutive passes, the RCS manifold RM Dilemma Flag for that manifold will be set. MDM or LRU commfaults will not modify the dilemma pass counter or the RM Dilemma The flag will be reset, however, if any of the four manifold open/close discretes change state.

The transition of an MDM commfault discrete from false to true will cause the status of all affected manifolds to be set to close in all major modes. In major mode 1, the same is true of an LRU commfault. In major modes 2 and 3, the transition of an LRU commfault will cause no change in manifold statuses.

The crew is able to override the status of all manifolds on an individual basis by item entries on the RCS SPEC display via the Manifold Status Override. The setting of this discrete for a manifold will change the manifold's status to its complementary state and will then reset the discrete. The use of the Manifold Status Override feature will not inhibit or modify any of the other functions of the manifold

status monitor. The module will continue to honor subsequent changes in the affected manifold's input signals (open/close discretes, commfaults, override discrete) as specified in this section.

The Manifold Close Status Override is used in Major Modes 1 and 3 open all manifolds whose status is closed and whose open/close discretes are in dilemma. This discrete can be set by item entry on the Override page, and will be reset to false after the reconfiguration is complete. The use of the Manifold Close Status Override feature will not inhibit or modify any of the other functions of the Manifold Status Monitor.

3.2.6 Available Jet Status Table

The Available Jet Status table module provides a list of jets available for use to the Jet Select Logic Module in the Flight Control System software.

The Available Jet Status Table uses the manifold open/close discretes (15 discretes) from the Manifold Status Monitor, and the jet deselect output discretes (44 discretes) from the Jet Fault Limit Module as inputs, and outputs the jet available discretes (44 discretes) and the jet status change discrete (one discrete).

The Available Jet Status Table's logic "AND"s the jet deselect output discrete with the manifold open/close status discrete and statuses a jet as available to the Flight Control System if the discretes indicate select and open, respectively. The Available Jet Status Table will be computed each time that the jet status change discrete is true.

In the BFS, jet failures are detected only when BFS is engaged. The Jet Failed Leaking and Jets Failed-Off detection in the BFS is the same as in the PASS, but the jet chamber pressure feedback discrete is used for Jet Fail-On detection in the BFS rather than the RJD output discrete which is used in the PASS.

3.3 Interfaces and Locations

The RCS interfaces with the following systems: Data Processing System, Displays and Controls, Caution and Warning, Orbital Maneuvering System, Electrical Power Distribution and Control, and the Pulse Code Modulator. In addition, the RCS interfaces with the crew.

3.3.1 Data Processing System

The RCS sends data consisting of pressures, temperatures, and valve positions to the Data Processing System (DPS) through the flight-critical Multiplexer Demultiplexers (MDMs) to have the data processed by the GPCs. The GPCs use this data

to monitor and display the configuration and status of the RCS. The GPCs also provide valve configuration commands to the RCS and jet on/off commands to the RCS via the Reaction Jet Drivers Aft and Forward (RJDA and RJDF).

The Flight Control software uses the RCS Digital Automatic Pilot (DAP) to hold attitude or to accomplish an attitude maneuver by virtue of an error correction method. The State Estimator takes IMU data from the Attitude Processor software (ATT PROC), filters it, and sends it to a module called RCS Errors Phase Plane. In the RCS Errors module, attitude commands coming from the hand controller or from the Universal Pointing software (which runs the display by the same name) are compared with the actual attitude as computed by the State Estimator. The result is an attitude error and rate error which are passed on to the Phase Plane module. The Phase Plane Module generates positive or negative rate commands for each axis. These commands are sent to the RCS Activity Lights and to the Jet Select module.

The Jet Select Module uses a look-up table to determine how many jets are needed from each directional cluster. "directional cluster" is a group of jets located within the same pod, forward, left, or right, which provide thrust in the same axis and direction.) There are several such tables which take into account jet failures, propellant feed constraints, and usage of OMS propellant. A Jet Priority Table is used to determine the particular jets to be fired. Each jet in a directional cluster is assigned a priority permission. If RCS RM removes a jet from the Available Jet Status Table, the jet will be removed from the Jet Priority Thus, the Jet Select Module logic will automatically select the next highest priority jet in that directional cluster. The crew has the capability to change a jet's priority on the Jet Priority Table or to override RM deselection of a jet from the Available Jet Status Table.

3.3.2 Displays and Controls

RCS data is sent to the Displays and Controls (D&C) to be displayed on dedicated displays. Switches and circuit breakers in the D&C panels are used for manual valve configuration and power routing to the RCS.

3.3.3 Caution and Warning

A selected portion of the RCS parameters are sent to the Caution and Warning (C&W) unit, where they are limit sensed to determine if RCS anomalies exist. If system anomalies are found, the C&W issues signals that illuminate the proper light on the C&W panel, the master alarm pushbutton indicators (pbis), and turn on the C&W tone.

3.3.4 Orbital Maneuvering System

The ARCS modules are connected with each other and with the OMS by propellant interconnect lines so that either or both OMS module's propellants can be fed to either or both of the ARCS modules.

3.3.5 Electrical Power Distribution and Control System

The Electrical Power Distribution and Control System (EPD&C) provides both AC and DC power to the RCS.

3.3.6 Pulse Code Modulator

Data from the RCS is routed through the Input/Output (I/O) MDMs to the Pulse Code Modulator (PCM) for incorporation in the telemetry downlink to be sent to the ground and to the onboard recorders.

3.3.7 Crew

The crew monitors and controls the RCS performance through CRT displays, fault messages, keyboard item entries, C&W indications, and associated switches and indicators.

3.4 Hierarchy

Figures 4 through 7 illustrate the hierarchy of the RCS hardware components. Figures 8 through 20 depict the functional details of the RCS subsystem components.

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4.0 ASSESSMENT RESULTS

The IOA analysis of the RCS hardware initially generated two hundred eight (208) failure mode worksheets and identified one hundred forty-one (141) potential critical items (PCIs) before starting the assessment process. The EPD&C subsystem analysis initially generated two thousand sixty-four (2064) worksheets with four hundred forty-nine (449) PCIs. These analysis results along with additional analysis results generated during the assessment (Appendix E) were compared to the proposed NASA baseline of ninety-nine (99) hardware and five hundred twenty-four (524) EPD&C FMEAs, and sixty-two (62) hardware and one hundred forty-four (144) EPD&C CIL items. IOA mapped one hundred sixty-six (166) hardware and five hundred ninety-seven (597) EPD&C FMEAs, and one hundred thirty-three (133) hardware and one hundred sixteen (116) EPD&C CILs and PCIs into the NASA FMEAS and CILs. Upon completion of the assessment, and after discussions with the NASA subsystem manager, ninety-six (96) hardware issues, eighty-three (83) of which concern CIL items or PCIs, and two hundred eighty (280) EPD&C issues, one hundred fifty-eight (158) of which concern CIL items or PCIs, remain unresolved. Each of these unresolved issues are presented in subsequent section 4 paragraphs as well as in the detailed assessment worksheets (Appendix C). Any IOA issues which were resolved with the NASA subsystem manager are documented as such on the detailed assessment worksheets, but are not discussed in section 4.

Appendix C presents detailed assessment worksheets for each failure mode identified and assessed. These worksheets detail the assessments of each failure mode and document unresolved issues, resolved issues, plus any additional non-issue recommendations and comments. Appendix D highlights the IOA recommended critical items list and corresponding IOA worksheet ID. Appendix E contains IOA analysis worksheets supplementing previous analysis results reported in Space Transportation System Engineering and Operations Support (STSEOS) Working Paper No. 1.0-WP-VA86001-27, Analysis of the Reaction Control System, January 19, 1987. Appendix F provides a cross reference between the NASA FMEAs and corresponding IOA worksheet(s) along with IOA recommendations and an issues "flag" to denote the FMEAs with which IOA has unresolved issues. Appendix G identifies IOA analysis worksheets that have been superseded by the re-analysis shown in Appendix E.

Following the hierarchy breakdown shown in Figures 4-7, the RCS assessment results are summarized in the tables below.

Tables I-A.1, I-B.1, I-A.2, and I-B.2 present summaries of the IOA FMEA assessments for the forward RCS hardware, forward RCS EPD&C, aft RCS hardware, and aft RCS EPD&C, respectively. The IOA INTL column is the initial number of IOA failure modes for each RCS component. The recommended IOA FMEA baseline (IOA MAP) versus the NASA FMEA baseline, and resulting unresolved issues are presented in the subsequent columns. The unresolved failure mode issues for each RCS component are discussed in the associated section 4 paragraph referenced in the final column.

Tables II-A.1, II-B.1, II-A.2, and II-B.2 present summaries of the IOA CIL assessments for the forward RCS hardware, forward RCS EPD&C, aft RCS hardware, and aft RCS EPD&C, respectively. The IOA INTL column is the initial number of IOA PCIs for each RCS component. The recommended IOA CIL baseline (IOA MAP) versus the NASA CIL baseline, and resulting unresolved issues are presented in the subsequent columns. Again, the unresolved failure mode issues for each RCS component are discussed in the associated section 4 paragraph referenced in the final column.

Tables III-A.1, III-B.1, III-A.2, and III-B.2 present summaries of the recommended IOA FMEA baselines for the forward RCS hardware, forward RCS EPD&C, aft RCS hardware, and aft RCS EPD&C, respectively.

Tables IV-A.1, IV-B.1, IV-A.2, and IV-B.2 present summaries of the recommended IOA CIL baselines for the forward RCS hardware, forward RCS EPD&C, aft RCS hardware, and aft RCS EPD&C, respectively.

TABLE I-A.1 Summary of IOA FMEA Assessment - FRCS Hardware						
Components	IOA INTL	IOA MAP	NASA FMEAS	ISSUES	PARAGRAPHS FOR ISSUES	
HE PRESS SUBSYSTEM STORAGE TANK TANK ISOLATION VALVES REGULATOR ASSEMBLIES QUAD CHECK VALVE ASSEMBLY COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 2 6 2 6 2 4	1 5 4 5 4	1 2 2 3 4 2	0 5 4 4 1 2 0	4.1.2.1.A.1 4.1.2.1.A.1 4.1.2.1.A.2 4.1.2.1.A.3 4.1.2.1.A.4 4.1.2.1.A.4	
PROP STOR & DIST SUBSYSTEM PROPELLANT TANKS PROPELLANT CHANNEL SCREENS PROPELLANT FEEDOUT TUBES PRESSURE RELIEF ASSEMBLIES GROUND MANUAL ISOL VALVES GIMBAL BELLOWS TANK ISOL VALVES MANIFOLD ISOL VLVS, PRIMARY MANIFOLD ISOL VLVS, VERNIER JET ALIGNMENT BELLOWS, PRIMARY JET ALIGNMENT BELLOWS, VERNIER COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 1 2 3 2 6 10 2 2 2 2 2 4 2	1 0 8 2 1 6 5 1 0 4 4	1 0 5 1 4 4 3 1 0 2 2 1	0 1 0 3 1 0 5 4 4 1 0 2 2 0	4.1.2.2.A.1 4.1.2.2.A.2 4.1.2.2.A.3 4.1.2.2.A.4 4.1.2.2.A.5 4.1.2.2.A.6 4.1.2.2.A.6 4.1.2.2.A.8 4.1.2.2.A.8	
THRUSTER SUBSYSTEM PRIMARY JETS BIPROP SOLENOID VALVES INJECTOR HEAD COMBUSTION CHAMBER OR NOZZLE VERNIER JETS BIPROP SOLENOID VALVES COMBUSTION CHAMBER OR NOZZLE	9 0 1 5	6 2 2 3 1	3 0 2 2	6 2 0 2 0	4.1.2.3.A 4.1.2.3.A.1 4.1.2.3.A.2 4.1.2.3.A.3	
TOTAL	99	78	49	49		

TABLE I-B.1 Summary of IOA FMEA	Assess	ment	- FRCS	EPD&C	
Components	IOA INTL	IOA MAP	NASA FMEAS	ISSUES	PARAGRAPHS FOR ISSUES
HE PRESS SUBSYSTEM					4.1.2.1.B
CONTROLS					
VALVES					
CONTROLLER	8	4	4	0	
DIODE	16	9	7	5	4.1.2.1.B.1
DRIVER	12	8	8	2	4.1.2.1.B.2
FUSE	2	1	1	0	
RESISTOR	16	3	3	2	4.1.2.1.B.3
SWITCH, TOGGLE	5	2	2	1 1	4.1.2.1.B.4
MICROSWITCH	1	1	0	1	4.1.2.1.B.5
INSTRUMENTATION					
INDICATOR, POSITION	1	1	1	1	4.1.2.1.B.6
SENSOR, PRESSURE	8	1	1	0	
SENSOR, TEMPERATURE	4	1	1	0	
PROP STOR & DIST SUBSYSTEM					4.1.2.2.B
CONTROLS					
VALVES					
CONTROLLER	4	4	4	4	4.1.2.2.B.1
DIODE	197	71	67	27	4.1.2.2.B.2
DRIVER	38	20	20	20	4.1.2.2.B.3
FUSE	10	4	4	1	4.1.2.2.B.4
RELAY	40	12	12	9	4.1.2.2.B.5
RESISTOR	100	16	16	10	4.1.2.2.B.6
SWITCH, TOGGLE	35	8	8	3	4.1.2.2.B.7
MICROSWITCH	. 8	8	0	8	4.1.2.2.B.8
CIRCUIT BREAKER	2	2	2	1	4.1.2.2.B.9
METERS/ROTARY SWITCH	5	4	4	2	4.1.2.2.B.10
INSTRUMENTATION					
INDICATOR, POSITION	12	6	6	6	4.1.2.2.B.11
SENSOR, PRESSURE	24	2	2	0	
SENSOR, TEMPERATURE	14	1	1	0	
THRUSTER SUBSYSTEM					4.1.2.3.B
CONTROLS					
VALVES					
CONTROLLER	24	10	10	5	4.1.2.3.B.1
DIODE	46	17	12	7	4.1.2.3.B.2
DRIVER	12	4	4	3	4.1.2.3.B.3
FUSE	13	4	4	3	4.1.2.3.B.4
RELAY	6	2	2	2	4.1.2.3.B.5
RESISTOR	80	11	10	1	4.1.2.3.B.6
SWITCH, TOGGLE	42	6	6	5	4.1.2.3.B.7
SIGNAL CONDITIONER	3	3	2	1	4.1.2.3.B.8
INSTRUMENTATION					
SENSOR, CONTINUITY	4	4	0	0	
SENSOR, PRESSURE	10	4	2	2	4.1.2.3.B.9
SENSOR, TEMPERATURE	10	4	1 2	2	4.1.2.3.B.10

TABLE I-B.1 Summary of IOA FMEA Assessment - FRCS EPD&C (cont'd)							
Components	IOA INTL	IOA MAP	NASA FMEAS	ISSUES	PARAGRAPHS FOR ISSUES		
THERMAL CONTROL SUBSYSTEM THRUSTERS					4.1.2.4.B		
FUSE	5	3	3	0			
HEATER	8	4	4	0			
RESISTOR	10	1	1 1	0			
SWITCH, THERMAL	12	4	3	2	4.1.2.4.B.1		
SWITCH, TOGGLE	25	4	4	0			
POD							
DRIVER	24	2	2	1	4.1.2.4.B.2		
FUSE	12	2	2	0			
HEATER	12	1	1	0			
RELAY	4	2	2	0			
RESISTOR	16	3	3	0			
SWITCH, TOGGLE	5	2	2	0			
TOTAL	945	287	254	137			

MADID TA					
TABLE I-A.2 Summary of IOA FM	EA Asse	ssment	- ARCS	Hardwa	ire
Components	IOA INTL	IOA MAP		ISSUES	PARAGRAPHS FOR ISSUES
HE PRESS SUBSYSTEM STORAGE TANK TANK ISOLATION VALVES REGULATOR ASSEMBLIES QUAD CHECK VALVE ASSEMBLY COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 2 6 2 4 4 4	1 5 4 7 4 1	1 2 2 3 4 2 1	0 4 3 2 3 2 0	4.2.2.1.A.1 4.2.2.1.A.2 4.2.2.1.A.3 4.2.2.1.A.4 4.2.2.1.A.4
PROP STOR & DIST SUBSYSTEM PROPELLANT TANKS PROPELLANT CHANNEL SCREENS PROPELLANT FEEDOUT TUBES PRESSURE RELIEF ASSEMBLIES GROUND MANUAL ISOL VALVES GIMBAL BELLOWS TANK ISOL VALVES CROSSFEED VALVES MANIFOLD ISOL VLVS, PRIMARY MANIFOLD ISOL VLVS, VERNIER JET ALIGNMENT BELLOWS, PRIMARY JET ALIGNMENT BELLOWS, VERNIER COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 1 2 3 2 6 6 10 2 2 2 2 20 8 4	1 0 8 2 1 8 6 6 5 1 0 4 4 1	1 0 5 1 1 4 4 4 3 1 0 2 2	0 1 0 3 1 0 5 3 4 2 0 0 2 2	4.2.2.2.A.1 4.2.2.2.A.2 4.2.2.2.A.3 4.2.2.2.A.4 4.2.2.2.A.5 4.2.2.2.A.6 4.2.2.2.A.7
THRUSTER SUBSYSTEM PRIMARY JETS BIPROP SOLENOID VALVES INJECTOR HEAD COMBUSTION CHAMBER OR NOZZLE VERNIER JETS BIPROP SOLENOID VALVES COMBUSTION CHAMBER OR NOZZLE	9 0 . 1 5	6 2 2 3 1	3 0 2 2	6 2 0 2	4.2.2.3.A 4.2.2.3.A.1 4.2.2.3.A.2
TOTAL	109	88	53	47	

TABLE I-B.2 Summary of IOA FMEA Assessment - ARCS EPD&C								
Components	IOA INTL	IOA MAP	NASA FMEAS	ISSUES	PARAGRAPHS FOR ISSUES			
HE PRESS SUBSYSTEM					4.2.2.1.B			
CONTROLS VALVES CONTROLLER DIODE DRIVER FUSE RESISTOR SWITCH, TOGGLE MICROSWITCH INSTRUMENTATION INDICATOR, POSITION SENSOR, PRESSURE	16 25 24 4 32 5 1	4 9 7 1 3 2 1	4 7 7 1 3 2 0	0 4 2 0 2 0 1	4.2.2.1.B.1 4.2.2.1.B.2 4.2.2.1.B.3 4.2.2.1.B.4 4.2.2.1.B.5			
SENSOR, TEMPERATURE	4	1	1	0	4.2.2.2.B			
PROP STOR & DIST SUBSYSTEM CONTROLS VALVES CONTROLLER DIODE DRIVER FUSE RELAY RESISTOR SWITCH, TOGGLE MICROSWITCH CIRCUIT BREAKER INSTRUMENTATION INDICATOR, POSITION SENSOR, PRESSURE SENSOR, TEMPERATURE	4 177 54 17 48 139 50 9 2	4 87 25 6 16 25 12 9 2	4 83 25 6 16 19 12 0 2	3 35 21 0 11 19 4 9 2 8 0	4.2.2.2.B.1 4.2.2.2.B.2 4.2.2.2.B.3 4.2.2.2.B.4 4.2.2.2.B.5 4.2.2.2.B.6 4.2.2.2.B.7 4.2.2.2.B.8 4.2.2.2.B.9			
THRUSTER SUBSYSTEM CONTROLS VALVES CONTROLLER DIODE DRIVER FUSE RELAY RESISTOR SWITCH, TOGGLE SIGNAL CONDITIONER INSTRUMENTATION SENSOR, CONTINUITY SENSOR, PRESSURE SENSOR, TEMPERATURE	36 90 24 19 6 122 40 4	6 12 6 3 2 10 4 2	6 12 6 3 2 10 4 2	2 0 3 0 1 0 2 0	4.2.2.3.B.1 4.2.2.3.B.2 4.2.2.3.B.3 4.2.2.3.B.4 4.2.2.3.B.4			

TABLE I-B.2 Summary of IOA FME	A Asses	sment	- ARCS	EPD&C	(cont'd)
Components	IOA INTL	IOA MAP	NASA FMEAS	ISSUES	PARAGRAPHS FOR ISSUES
THERMAL CONTROL SUBSYSTEM THRUSTERS FUSE HEATER RESISTOR SWITCH, THERMAL SWITCH, TOGGLE DRIVER	5 8 10 8 25	2 4 1 8 4 4	2 4 1 0 4	000800	4.2.2.4.B 4.2.2.4.B.1
TOTAL	1083	310	270	143	

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TABLE II-A.1 Summary of IOA CIL Assessment - FRCS Hardware							
Components	IOA INTL	IOA MAP	NASA CILS	ISSUES	PARAGRAPHS FOR ISSUES		
HE PRESS SUBSYSTEM STORAGE TANK TANK ISOLATION VALVES REGULATOR ASSEMBLIES QUAD CHECK VALVE ASSEMBLY COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 1 5 2 3 0 4	1 5 5 4 2 2	1 0 1 2 2 1	0 5 4 4 0 1	4.1.2.1.A 4.1.2.1.A.1 4.1.2.1.A.2 4.1.2.1.A.3 4.1.2.1.A.4		
PROP STOR & DIST SUBSYSTEM PROPELLANT TANKS PROPELLANT CHANNEL SCREENS PROPELLANT FEEDOUT TUBES PRESSURE RELIEF ASSEMBLIES GROUND MANUAL ISOL VALVES GIMBAL BELLOWS TANK ISOL VALVES MANIFOLD ISOL VLVS, PRIMARY MANIFOLD ISOL VLVS, VERNIER JET ALIGNMENT BELLOWS, PRIMARY JET ALIGNMENT BELLOWS, VERNIER COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 1 2 2 2 4 6 1 2 2 12 0	1 0 7 1 1 3 4 4 1 0 2 2	1 1 0 4 0 1 1 2 1 0 1	0 1 0 3 1 0 3 4 3 1 0	4.1.2.2.A.1 4.1.2.2.A.2 4.1.2.2.A.3 4.1.2.2.A.4 4.1.2.2.A.5 4.1.2.2.A.6 4.1.2.2.A.6 4.1.2.2.A.8 4.1.2.2.A.8		
THRUSTER SUBSYSTEM PRIMARY JETS BIPROP SOLENOID VALVES INJECTOR HEAD COMBUSTION CHAMBER OR NOZZLE VERNIER JETS BIPROP SOLENOID VALVES COMBUSTION CHAMBER OR NOZZLE	7 0 1 5	6 2 2 3 1	2 0 2 2	6 2 0 2 0	4.1.2.3.A.1 4.1.2.3.A.1 4.1.2.3.A.2		
TOTAL	68	62	30	42			

Components IOA IOA NASA ISSUES PARAGRAPHS							
Components	IOA INTL	MAP	CILS	ISSUES	FOR ISSUES		
HE PRESS SUBSYSTEM					4.1.2.1.B		
CONTROLS							
VALVES							
CONTROLLER	0	0	0	0			
DIODE	3	2	2	3	4.1.2.1.B.		
DRIVER	0	0	0	0			
FUSE	0	0	0	0			
RESISTOR	0	0	0	0			
SWITCH, TOGGLE	2	1	0	1 1	4.1.2.1.B.		
MICROSWITCH	0	0	0	0			
INSTRUMENTATION			1				
INDICATOR, POSITION	0	0	0	0			
SENSOR, PRESSURE	0	0	0	0			
SENSOR, TEMPERATURE	0	0	0	0			
ROP STOR & DIST SUBSYSTEM					4.1.2.2.B		
CONTROLS							
VALVES							
CONTROLLER	1	1	2	3	4.1.2.2.B.		
DIODE	10	4	9	11	4.1.2.2.B.		
DRIVER	8	5	8	12	4.1.2.2.B.		
FUSE	0	0	0	0			
RELAY	20	7	6	9	4.1.2.2.B.		
RESISTOR	0	0	4	4	4.1.2.2.B.		
SWITCH, TOGGLE	10	2	1	2	4.1.2.2.B.		
MICROSWITCH	2	2	0	2	4.1.2.2.B.		
CIRCUIT BREAKER	0	0	1	1 1	4.1.2.2.B.		
METERS/ROTARY SWITCH	0	0	0	0			
INSTRUMENTATION							
INDICATOR, POSITION	0	0	2	2	4.1.2.2.B.		
SENSOR, PRESSURE	0	0	0	0			
SENSOR, TEMPERATURE	0	0	0	0			
HRUSTER SUBSYSTEM					4.1.2.3.B		
CONTROLS							
VALVES							
CONTROLLER	9	3	3	4	4.1.2.3.B.		
DIODE	23	11	7	8	4.1.2.3.B.		
DRIVER	4	2	3	3	4.1.2.3.B.		
FUSE	12	5	1	3	4.1.2.3.B.		
RELAY	3	1	0	1 1	4.1.2.3.B.		
RESISTOR	6	2	2	0			
SWITCH, TOGGLE	17	3	1	2	4.1.2.3.B.		
SIGNAL CONDITIONER	2	2	1	1 1	4.1.2.3.B.		
INSTRUMENTATION							
SENSOR, CONTINUITY	0	0	0	0			
SENSOR, PRESSURE	2	2	0	2	4.1.2.3.B.		
SENSOR, TEMPERATURE	2	2	1 0	1 2 1	4.1.2.3.B.		

TABLE II-B.1 Summary of IOA CIL Assessment - FRCS EPD&C (cont'd)							
Components	IOA INTL	IOA MAP	NASA CILS	ISSUES	PARAGRAPHS FOR ISSUES		
THERMAL CONTROL SUBSYSTEM THRUSTERS					4.1.2.4.B		
FUSE	1	1	1	0			
HEATER	1	1	1	0			
RESISTOR	0	0	0	0			
SWITCH, THERMAL	1	1	0	1	4.1.2.4.B.1		
SWITCH, TOGGLE	3	1	1	0			
POD			İ				
DRIVER	0	0	0	0			
FUSE	0	0	0	0			
HEATER	0	0	0	0			
RELAY	0	0	0	0			
RESISTOR	0	0	0	0			
SWITCH, TOGGLE	3	1	1	0			
TOTAL	145	62	57	77			

TABLE II-A.2 Summary of IOA CIL Assessment - ARCS Hardware							
Components	IOA INTL	IOA MAP	NASA CILS	ISSUES	PARAGRAPHS FOR ISSUES		
HE PRESS SUBSYSTEM STORAGE TANK TANK ISOLATION VALVES REGULATOR ASSEMBLIES QUAD CHECK VALVE ASSEMBLY	1 1 5 2	1 5 4	1 1 2 2	0 4 3 2	4.2.2.1.A 4.2.2.1.A.1 4.2.2.1.A.2 4.2.2.1.A.3		
COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	2 0 4	3 2 1	2 1 1	1 1 0	4.2.2.1.A.4 4.2.2.1.A.4		
PROP STOR & DIST SUBSYSTEM PROPELLANT TANKS PROPELLANT CHANNEL SCREENS PROPELLANT FEEDOUT TUBES PRESSURE RELIEF ASSEMBLIES GROUND MANUAL ISOL VALVES GIMBAL BELLOWS TANK ISOL VALVES CROSSFEED VALVES MANIFOLD ISOL VLVS, PRIMARY MANIFOLD ISOL VLVS, VERNIER JET ALIGNMENT BELLOWS, PRIMARY JET ALIGNMENT BELLOWS, VERNIER COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 1 2 2 2 5 6 6 1 2 10 0	1 0 7 1 7 4 5 4 1 0 2 2	1 0 4 0 1 2 1 0 1	0 1 0 3 1 0 5 2 4 2 0 0 1 0	4.2.2.2.A.1 4.2.2.2.A.2 4.2.2.2.A.3 4.2.2.2.A.4 4.2.2.2.A.5 4.2.2.2.A.6 4.2.2.2.A.7		
THRUSTER SUBSYSTEM PRIMARY JETS BIPROP SOLENOID VALVES INJECTOR HEAD COMBUSTION CHAMBER OR NOZZLE VERNIER JETS BIPROP SOLENOID VALVES COMBUSTION CHAMBER OR NOZZLE	6 0 1 5 1	6 2 2 3 1	2 0 2 2	6 2 0 2 0	4.2.2.3.A 4.2.2.3.A.1 4.2.2.3.A.2 4.2.2.3.A.3		
TOTAL	73	71	35	41			

TABLE II-B.2 Summary of IOA CIL Assessment - ARCS EPD&C								
Components	IOA INTL	IOA MAP	NASA CILS	ISSUES	PARAGRAPHS FOR ISSUES			
HE PRESS SUBSYSTEM					4.2.2.1.B			
CONTROLS								
VALVES								
CONTROLLER	0	0	0	0				
DIODE	4	2	2	2	4.2.2.1.B.1			
DRIVER	0	0	0	0				
FUSE	0	0	0	0				
RESISTOR	0	0	0	0				
SWITCH, TOGGLE	4	1	1	0				
MICROSWITCH	0	0	0	0				
INSTRUMENTATION	_		_	_				
INDICATOR, POSITION	0	0	0	0				
SENSOR, PRESSURE	0	0	0	0				
SENSOR, TEMPERATURE	0	0	0	0				
PROP STOR & DIST SUBSYSTEM					4.2.2.2.B			
CONTROLS				1				
VALVES								
CONTROLLER	0	0	3	3	4.2.2.2.B.1			
DIODE	15	9	22	25	4.2.2.2.B.2			
DRIVER	5	5	13	15	4.2.2.2.B.3			
FUSE	0	0	0	0				
RELAY	10	5	9	10	4.2.2.2.B.4			
RESISTOR	0	0	5	5	4.2.2.2.B.5			
SWITCH, TOGGLE	10	3	2	4	4.2.2.2.B.6			
MICROSWITCH	1 1	1	0	1 2	4.2.2.2.B.7			
CIRCUIT BREAKER	1	1		4	4.2.2.2.B.8			
INSTRUMENTATION	0	o	3	3	4.2.2.2.B.9			
INDICATOR, POSITION	0	Ö	0	0	4.2.2.2.0.9			
SENSOR, PRESSURE SENSOR, TEMPERATURE	0	0	0	0				
SENSOR, TEMPERATURE	-	<u> </u>	-	-				
THRUSTER SUBSYSTEM				-	4.2.2.3.B			
CONTROLS]				
VALVES	_	,	_	,	4 2 2 2 2 2 3			
CONTROLLER	2	1	3	2	4.2.2.3.B.1			
DIODE	62	6	6	0 3	4.2.2.3.B.2			
DRIVER	4 8	2 1	5 1	0	4.4.4.J.D.4			
FUSE RELAY	ő	0	0	0				
RESISTOR	9	2	2					
SWITCH, TOGGLE	4	1	1	2	4.2.2.3.B.4			
SIGNAL CONDITIONER	2	2	2	0	1.2.2.3.0.7			
INSTRUMENTATION	"	_	-					
SENSOR, CONTINUITY	0	0	0	0				
SENSOR, CONTINOTITE SENSOR, PRESSURE	Ö	0	Ö	0				
SENSOR, PRESSURE SENSOR, TEMPERATURE	0	0	0	0				
DEMOUN, TEMPERATURE			L					

TABLE II-B.2 Summary of IOA CI	L Asses	sment	- ARCS	EPD&C	(cont'd)
Components	IOA INTL	IOA MAP	NASA CILS	ISSUES	PARAGRAPHS FOR ISSUES
THERMAL CONTROL SUBSYSTEM THRUSTERS FUSE HEATER RESISTOR SWITCH, THERMAL SWITCH, TOGGLE DRIVER	5 1 0 4 15 5	2 1 0 4 2 2	2 1 0 0 2 2	0 0 0 4 0	4.2.2.4.B 4.2.2.4.B.1
TOTAL	171	54	87	81	

TABLE III-A.1 IOA Recommended Criticalities - FRCS Hardware							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
HE PRESS SUBSYSTEM STORAGE TANK TANK ISOLATION VALVES REGULATOR ASSEMBLIES QUAD CHECK VALVE ASSEMBLY COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 1 2 0 0	0 2 2 2 2 0 0	0 0 0 0 0 0	0 2 1 0 0 2	0 0 1 0 0 0 0	0 0 0 0 3 2	1 5 5 4 5 4
PROP STOR & DIST SUBSYSTEM PROPELIANT TANKS PROPELIANT CHANNEL SCREENS PRESSURE RELIEF ASSEMBLIES GROUND MANUAL ISOL VALVES GIMBAL BELLOWS TANK ISOL VALVES MANIFOLD ISOL VLVS, PRIMARY MANIFOLD ISOL VLVS, VERNIER JET ALIGNMENT BELLOWS, PRIMARY COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 2 1 1 2 2 1 0 0	003002210200	00000010000	003003110020	00000000000	0 0 0 1 0 0 0 0 0 2 2	1 8 2 1 6 5 5 1 4 4 1
THRUSTER SUBSYSTEM PRIMARY JETS BIPROP SOLENOID VALVES INJECTOR HEAD COMBUSTION CHAMBER OR NOZZLE VERNIER JETS BIPROP SOLENOID VALVES COMBUSTION CHAMBER OR NOZZLE	4 2 2 2	2 0 0	0 0 0	000	000	0 0 0	6 2 2 3
TOTAL	30	20	2	15	1	10	78

TABLE III-B.1 IOA Recommended Criticalities - FRCS EPD&C							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
HE PRESS SUBSYSTEM							
CONTROLS							
VALVES	ĺ						
CONTROLLER	0	0	0	3	0	1	4
DIODE	0	1	0	3	1	4	9
DRIVER	0	0	0	5	2	1	8
FUSE	0	0	0	1	0	0	1
RESISTOR	0	0	0	0	2	1	3
SWITCH, TOGGLE	Ö	i	Ō	o	0	1	2
MICROSWITCH	0	ō	ŏ	٥	1	0	ī
INSTRUMENTATION					_	•	_
	0	0	0	0	1	lo	1
INDICATOR, POSITION	0	Ö	Ö	Ö	ī	ő	ī
SENSOR, PRESSURE	0	0	0	0	ō	ı	ī
SENSOR, TEMPERATURE	0	<u> </u>	<u> </u>	0	U		
PROP STOR & DIST SUBSYSTEM	1						
CONTROLS							
VALVES					_		
CONTROLLER	0	0	1	1	0	2	4
DIODE	0	2	2	12	11	44	71
DRIVER	0	1	4	4	7	4	20
FUSE	0	0	0	4	0	0	4
RELAY	0	6	0	6	0	0	12
RESISTOR	Ιo	l o	0	0	10	6	16
SWITCH, TOGGLE	1 0	1	l o	7	· 0	0	8
MICROSWITCH	١٥	2	0	Ιo	6	0	8
CIRCUIT BREAKER	0	Ō	0	l 1	Ιo	1	2
METERS/ROTARY SWITCH	0	ŀŏ	ا	ا <u> </u>	2	2	4
INSTRUMENTATION	"	"		"	-	_	•
INDICATOR, POSITION	0	١٥	lo	0	6	0	6
	0	0	۱ŏ	0	2	١٥	2
SENSOR, PRESSURE	0	0	0	0	1	6	ı
SENSOR, TEMPERATURE	- 0	-					
THRUSTER SUBSYSTEM			İ				
CONTROLS				1			
VALVES							
CONTROLLER	0	2	1	2	0	5	10
DIODE	0	5	1	5	0	6	17
DRIVER	0	1	1	0	0	2	4
FUSE	0	3	1	0	0	0	4
RELAY	l o	1	0	0	0	1	2
RESISTOR	Ŏ	Ιō	Ö	li	2	8	11
SWITCH, TOGGLE	l ŏ	2	ı	Ιō	0	3	6
SIGNAL CONDITIONER		ō	Ī	ľi	i	0	3
INSTRUMENTATION	ĭ		•	-	-		
SENSOR, CONTINUITY	0	١٥	l 0	0	0	4	4
	0	0	0	0	4	ō	4
SENSOR, PRESSURE		_	1	0	4	0	4
SENSOR, TEMPERATURE	0	0	0	١	4	"	4

TABLE III-B.1 IOA Recommended Criticalities - FRCS EPD&C (cont'd)							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
THERMAL CONTROL SUBSYSTEM THRUSTERS FUSE HEATER RESISTOR SWITCH, THERMAL SWITCH, TOGGLE POD DRIVER FUSE HEATER RELAY RESISTOR	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0	1 1 0 1 1 0 0 0	0 0 0 0 0 0 0 0 0	2 1 3 1 2 2 1 1	0 2 0 0 2 0 0 0	3 4 1 4 4 2 2 1 2 4
SWITCH, TOGGLE	0	0	1	0	0	1	2
TOTAL	0	28	18	56	79	106	287

TABLE III-A.2 IOA Recommended Criticalities - ARCS Hardware							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
HE PRESS SUBSYSTEM STORAGE TANK TANK ISOLATION VALVES REGULATOR ASSEMBLIES QUAD CHECK VALVE ASSEMBLY COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 1 2 0 0	0 2 1 2 3 0	0 0 0 0 0	0 2 1 0 0 2	0 0 1 0 0 0	0 0 0 0 4 2	1 5 4 4 7 4
PROP STOR & DIST SUBSYSTEM PROPELLANT TANKS PROPELLANT CHANNEL SCREENS PRESSURE RELIEF ASSEMBLIES GROUND MANUAL ISOL VALVES GIMBAL BELLOWS TANK ISOL VALVES CROSSFEED VALVES MANIFOLD ISOL VLVS, PRIMARY MANIFOLD ISOL VLVS, VERNIER JET ALIGNMENT BELLOWS, PRIMARY COUPLINGS (SINGLE SEAL) LINES AND FITTINGS	1 1 2 1 1 2 2 2 2 3 1 0 0	0 0 3 0 0 1 0 1 0 0 2	0 0 0 0 0 1 2 0 1 0 0	0 0 3 0 0 4 2 3 1 0 0 2 0	000000000000	0 0 0 1 0 0 0 0 0 0 2 2	1 8 2 1 8 6 5 1 4 4 1
THRUSTER SUBSYSTEM PRIMARY JETS BIPROP SOLENOID VALVES INJECTOR HEAD COMBUSTION CHAMBER OR NOZZLE VERNIER JETS BIPROP SOLENOID VALVES COMBUSTION CHAMBER OR NOZZLE	4 2 2 2	0 0 0	0 0 0	2 0 0	000	0 0 0	6 2 2 3 1
TOTAL	34	15	5	22	1	11	88

TABLE III-B.2 IOA Recommended Criticalities - ARCS EPD&C							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
HE PRESS SUBSYSTEM							
CONTROLS							
VALVES							
CONTROLLER	0	0	0	3	0	1	4
DIODE	0	1	0	3	1	4	9
DRIVER	0	0	0	5	2	0	7
FUSE	0	0	0	1	0	0	1
RESISTOR	0	0	0	0	2	1	3
SWITCH, TOGGLE	o	li	O	1	0	0	2
MICROSWITCH	o	0	Ô	0	i	Ô	1
INSTRUMENTATION	•				_		_
INDICATOR, POSITION	0	0	0	0	1	0	1 1
SENSOR, PRESSURE	0		Ö	Ö	ī	Ö	l i
	0	0	0	0	0	1	1
SENSOR, TEMPERATURE			U	0	0	<u> </u>	T
PROP STOR & DIST SUBSYSTEM							
CONTROLS							
VALVES							ŀ
CONTROLLER	0	0	1	1	0	2	4
DIODE	0	0	4	22	12	49	87
DRIVER	0	0	4	4	10	7	25
FUSE	0	0	0	5	0	1	6
RELAY	0	1	2	10	1	2	16
RESISTOR	l o	0	0	0	13	12	25
SWITCH, TOGGLE	0	0	3	7	0	2	12
MICROSWITCH	١ŏ	0	1	3	5	ō	9
CIRCUIT BREAKER	0	Ö	ī	0	0	1	2
	"		_			-	-
INSTRUMENTATION	١٥	0	0	o	8	0	8
INDICATOR, POSITION	_	-	_	0		0	1
SENSOR, PRESSURE	0	0	0	_	1		
SENSOR, TEMPERATURE	0	0	0	0	1	0	1
THRUSTER SUBSYSTEM							
CONTROLS							
VALVES	1						
CONTROLLER	0	0	1	2	0	3	6
DIODE	0	0	1	5	0	6	12
DRIVER	0	0	2	1	0	3	6
FUSE	0	0	0	3	0	0	3
RELAY	lŏ	Ō	ō	1	0	1	2
RESISTOR	l ŏ	ō	Ö	2	Ö	8	10
SWITCH, TOGGLE	l ŏ	ŏ	1	1	ŏ	2	4
SIGNAL CONDITIONER	0	2	ō	ō	Ö	0	2
				, J		, J	-
INSTRUMENTATION		_	_ ^		_	5	5
SENSOR, CONTINUITY	0	0	0	0	0		t l
SENSOR, PRESSURE	0	0	0	2	4	0	6
SENSOR, TEMPERATURE	0	0	0	2	1	2	5

TABLE III-B.2 IOA Recommended	Criti	calit	ies -	ARCS	EPD&	C (co	nt'd)
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
THERMAL CONTROL SUBSYSTEM THRUSTERS FUSE HEATER RESISTOR SWITCH, THERMAL SWITCH, TOGGLE DRIVER	0 0 0 0	0 0 0 0	2 1 0 1 2 2	0 0 0 0 0	0 1 0 3 0	0 2 1 4 2 2	2 4 1 8 4 4
TOTAL	0	5	29	84	68	124	310

TABLE IV-A.1 IOA Recommended Critical Items - FRCS Hardware							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL	
HE PRESS SUBSYSTEM							
STORAGE TANK	1	0	0	0	0	1	
TANK ISOLATION VALVES	1	2	0	2	0	5	
REGULATOR ASSEMBLIES	1	2	0	1	1	5	
QUAD CHECK VALVE ASSEMBLY	2	2	0	0	0	4	
COUPLINGS (SINGLE SEAL)	0	2	0	0	0	2	
COUPLINGS (DOUBLE SEAL)	0	0	0	2	0	2	
LINES AND FITTINGS	1	0	0	0	0	1	
PROP STOR & DIST SUBSYSTEM							
PROPELLANT TANKS	1	0	0	0	0	1	
PROPELLANT CHANNEL SCREENS	1	0	0	0	0	1	
PRESSURE RELIEF ASSEMBLIES	2	3	Ŏ	2	0	7	
GROUND MANUAL ISOL VALVES	ī	0	ō	o	0	1	
GIMBAL BELLOWS	ī	o	lŏ	ō	ō	1	
TANK ISOL VALVES	ī	2	Ō	ō	ō	3	
MANIFOLD ISOL VLVS, PRIMARY	2	2	Ö	ō	Ö	4	
MANIFOLD ISOL VLVS, VERNIER	2	1	1	Ŏ	ō	4	
JET ALIGNMENT BELLOWS, PRIMARY	lī	0	ō	Ö	Ŏ	1	
COUPLINGS (SINGLE SEAL)	Īō	2	Ö	Ō	ō	2	
COUPLINGS (DOUBLE SEAL)	ō	ō	ŏ	2	ŏ	2	
LINES AND FITTINGS	i	ŏ	Ŏ	ō	ō	ī	
THRUSTER SUBSYSTEM							
PRIMARY JETS							
BIPROP SOLENOID VALVES	4	2	0	o	o	6	
INJECTOR HEAD	2	0	Ö	0	0	2	
COMBUSTION CHAMBER OR NOZZLE	2	ő	0	0	0	2	
VERNIER JETS	4					2	
BIPROP SOLENOID VALVES	2	0	1	o	0	3	
COMBUSTION CHAMBER OR NOZZLE	1	ŏ	ō	ŏ	Ö	ì	
TOTAL	30	20	2	9	1	62	

TABLE IV-B.1 IOA Recommended C	ritica	al It	ems -	FRCS	EPD&	C
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
HE PRESS SUBSYSTEM						
CONTROLS						
VALVES	١ .	_				
CONTROLLER	0	0	0	0	0	0
DIODE	0	1	0	1	0	2
DRIVER	0	0	0	0	0	0 0
FUSE	0	0	0	0	0	1
RESISTOR	0	0	0	0	0	0
SWITCH, TOGGLE	0	1	0	0	0	1
MICROSWITCH	0	0	0	0	0	0
INSTRUMENTATION	_	_			_	
INDICATOR, POSITION	0	0	0	0	0	0
SENSOR, PRESSURE	0	0	0	0	0	0
SENSOR, TEMPERATURE	0	0	0	0	0	0
PROP STOR & DIST SUBSYSTEM						
CONTROLS			:			
VALVES						
CONTROLLER	0	0	1	0	0	1
DIODE	0	2	2	0	0	4
DRIVER	0	1	4	0	0	5
FUSE	0	0	0	0	0	0
RELAY	0	6	0	1	0	7
RESISTOR	0	0	0	0	0	0
SWITCH, TOGGLE	0	1	0	1	0	2
MICROSWITCH	0	2	0	0	0	2
CIRCUIT BREAKER	0	lo	0	0	0	0
METERS/ROTARY SWITCH						
INSTRUMENTATION						
INDICATOR, POSITION	0	0	0	0	0	l o
SENSOR, PRESSURE	0	0	0	lo	0	l o
SENSOR, TEMPERATURE	Ŏ	0	Ō	0	0	0
THRUSTER SUBSYSTEM		-				
CONTROLS					ĺ	
VALVES						
CONTROLLER	lo	2	1	l o	0	3
DIODE	ŏ	5	ī	5	ŏ	11
DRIVER	ő	li	l ī	٥	Ö	2
FUSE	ŏ	3	2	١٥	Ö	5
RELAY	Ö	i	هٔ	l ŏ	Ö	1
RESISTOR	Ö	ō	0	li	li	2
SWITCH, TOGGLE	0	2	1	٥	ō	3
SIGNAL CONDITIONER	0	ő	1	0	l	2
	"	"	+	١ ٢	+	
INSTRUMENTATION	1 ^	_		1 ^		
SENSOR, CONTINUITY	0	0	0	0	0	0
SENSOR, PRESSURE	0	0	0	0	2 2	2 2
SENSOR, TEMPERATURE	0	0	0	0	2	2

TABLE IV-B.1 IOA Recommended C	IL It	ems -	FRCS	EPD&	C (CO	nt'd)
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
THERMAL CONTROL SUBSYSTEM THRUSTERS	0	0	1	0	0	1
FUSE HEATER	O	ō	1	Ö	ŏ	ī
RESISTOR SWITCH, THERMAL	0	0	0	0	0	0
SWITCH, TOGGLE	0	0	1	0	0	1
POD DRIVER	0	o	0	0	0	0
FUSE HEATER	0	0	0	0	0	0
RELAY	0	0	0	0	0	0
RESISTOR SWITCH, TOGGLE	ő	0	1	ő	0	1
TOTAL	0	28	19	9	6	62

TABLE IV-A.2 IOA Recommended Critical Items - ARCS Hardware							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL	
HE PRESS SUBSYSTEM STORAGE TANK TANK ISOLATION VALVES REGULATOR ASSEMBLIES QUAD CHECK VALVE ASSEMBLY COUPLINGS (SINGLE SEAL) COUPLINGS (DOUBLE SEAL) LINES AND FITTINGS	1 1 2 0 0	0 2 1 2 3 0	0 0 0 0 0	0 2 1 0 0	0 0 1 0 0	1 5 4 4 3 2	
PROP STOR & DIST SUBSYSTEM PROPELLANT TANKS PROPELLANT CHANNEL SCREENS PRESSURE RELIEF ASSEMBLIES GROUND MANUAL ISOL VALVES GIMBAL BELLOWS TANK ISOL VALVES CROSSFEED VALVES MANIFOLD ISOL VLVS, PRIMARY MANIFOLD ISOL VLVS, VERNIER JET ALIGNMENT BELLOWS, PRIMARY COUPLINGS (SINGLE SEAL) LINES AND FITTINGS	1 1 2 1 1 2 2 2 3 1 0 0	0 0 3 0 0 1 0 1 0 0 2	0 0 0 0 0 1 2 0 0 0	0 0 2 0 0 3 0 2 0 0 0 2 0	00000000000	1 7 1 7 4 5 4 1 2 2	
THRUSTER SUBSYSTEM PRIMARY JETS BIPROP SOLENOID VALVES INJECTOR HEAD COMBUSTION CHAMBER OR NOZZLE VERNIER JETS BIPROP SOLENOID VALVES COMBUSTION CHAMBER OR NOZZLE	4 2 2 2	0 0 0	0 0 0	2 0 0 0 0	0 0 0	6 2 2 3 1	
TOTAL	34	15	5	16	1	71	

Criticality: HE PRESS SUBSYSTEM CONTROLS VALVES CONTROLLER	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
CONTROLS VALVES				<u> </u>		101110
VALVES		l				
CONTROLLER			-			!
	0	0	0	0	0	0
DIODE	0	1	0	1	0	2
DRIVER	0	0	0	0	0	0
FUSE	0	0	0	0	0	0
RESISTOR	0	0	0	0	0	0
SWITCH, TOGGLE	0	1	0	0	0	1
MICROSWITCH	0	0	0	0	0	0
INSTRUMENTATION					_	_
INDICATOR, POSITION	0	0	0	0	0	0
SENSOR, PRESSURE	0	0	0	0	0	0
SENSOR, TEMPERATURE	0	0	0	0	0	0
PROP STOR & DIST SUBSYSTEM						
CONTROLS						
VALVES						
CONTROLLER	0	0	1	0	0	1
DIODE	0	0	4	4	1	9
DRIVER	0	0	4	1	0	5
FUSE	Ö	0	0	0	0	0
RELAY	0	1	2	2	0	5
RESISTOR	0	0	0	0	0	0
SWITCH, TOGGLE	0	0	3	0	0	3
MICROSWITCH	0	0	1	0	0	1
CIRCUIT BREAKER	0	0	1	0	0	1
INSTRUMENTATION						
INDICATOR, POSITION	0	0	0	0	0	0
SENSOR, PRESSURE	0	0	0	0	0	0
SENSOR, TEMPERATURE	0	0	0	0	0	0
THRUSTER SUBSYSTEM						·
CONTROLS						
VALVES	-					
CONTROLLER	0	0	1	0	0	1
DIODE	0	0	1	5	0	6
DRIVER	0	0	2	0	0	2
FUSE	0	0	0	1	0	1
RELAY	0	0	0	0	0	0
RESISTOR	0	0	0	2	0	2
SWITCH, TOGGLE	0	0	1	0	0	1
SIGNAL CONDITIONER	0	2	0	0	0	2
INSTRUMENTATION						
SENSOR, CONTINUITY	0	0	0	0	0	0
SENSOR, PRESSURE	0	0	0	0	0	0
SENSOR, TEMPERATURE	0	0	0	0	0	0

TABLE IV-B.2 IOA Recommended CIL Items - ARCS EPD&C (cont'd)							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL	
THERMAL CONTROL SUBSYSTEM THRUSTERS FUSE HEATER RESISTOR SWITCH, THERMAL SWITCH, TOGGLE DRIVER	0 0 0 0 0	0 0 0 0	2 1 0 1 2	0 0 0 0	0 0 0 3 0	2 1 0 4 2 2	
TOTAL	0	5	29	16	4	54	

4.1 Forward RCS Assessment Results

The unresolved forward RCS hardware and EPD&C issues are presented in the following sections. Several general issues are first presented (section 4.1.1), followed by the specific unresolved issues (section 4.1.2).

4.1.1 General Forward RCS Issues

Many of the unresolved issues which exist on individual FMEAs and CILs are linked to several "general" issues identified by IOA during the RCS FMEA/CIL assessment. These general issues concern either the groundrules used by NASA/RI to perform the FMEA/CIL analysis, or the NASA/RI analysis of the RCS subsystem. Each of the general IOA issues results in numerous FMEA and CIL issues.

The general issues identified by IOA in the FRCS hardware and EPD&C assessments are discussed in the following sections.

4.1.1.A Hardware

Four general areas of difference between the IOA and NASA/RI forward RCS subsystem analyses are responsible for many of the unresolved FRCS hardware issues.

4.1.1.A.1 Inability to Deplete FRCS Propellant

IOA considers the inability to deplete FRCS prop to be potentially life and vehicle threatening during entry. Many flights include a nominal FRCS propellant dump after the OMS deorbit burn to achieve an improved X axis center-of-gravity (cg) condition for entry. On flights which would require a post-deorbit FRCS prop dump to meet the forward cg limit (1076.7 inches), inability to complete the dump could result in possible loss of entry control.

Failures which result in loss of propellant tank repressurization capability (loss of helium flow paths, loss of helium due to leakage) or loss of propellant flow paths are the types of failures which result in the inability to deplete FRCS propellant.

The current NASA/RI criticalities assigned to these types of failures are based only on loss of ET sep capability and do not consider possible entry effects. The criticalities assigned based only on ET sep correctly include tank ullage in the redundancy string. IOA agrees with the criticalities assigned by NASA/RI based only on ET sep effects, and agrees that ullage is sufficient to perform ET sep. However, IOA's more severe criticalities on these types of failures are driven by the possible entry effects discussed above. In this case, ullage may not be sufficient to deplete FRCS prop and, therefore, is not

included in the redundancy string.

IOA would concur with the current NASA/RI criticalities on failures which result in the inability to use or deplete FRCS propellant if it could be determined that no flights would be launched which required a nominal post-deorbit FRCS dump to meet the forward cg limit. However, IOA was unable to verify that this is the case. IOA recommends a documented flight rule which prohibits dependence on a nominal post-deorbit burn FRCS prop dump to meet the forward X cg limit.

Seventeen (17) of the FRCS hardware issues are related to this general issue.

4.1.1.A.2 Propellant Leakage

IOA considers any leakage of RCS propellant (MMH or NTO) to be potentially life and vehicle threatening, regardless of where the leakage occurs. NSTS 22206 states that "A single failure resulting in leakage of LO2, LH2, N2H4, or MMH shall be classified as a Criticality 1" (p. 2-11, item h). Therefore, IOA classifies any single failure which results in prop leakage as a 1/1. If redundant items must fail before leakage occurs, IOA classifies the failure as a functional criticality 1R. Propellant leakage can result in contamination and corrosion of other components, fire, explosion, or exposure of EVA and ground crews to propellant or propellant vapors.

Thirteen (13) of the FRCS hardware issues are related to this general issue.

4.1.1.A.3 Isolation Valve Internal Relief Device Failure

The propellant tank isolation valves, primary manifold isolation valves, and vernier manifold isolation valves each have an internal pressure relief device which would relieve a downstream overpressurization condition if the valve was closed. NASA/RI assigns 3/3 criticalities to the FMEAs which address the failure of this device to relieve downstream pressure. IOA contends that it is possible that a failed closed relief device could allow a downstream pressure build-up sufficient to cause a prop line leak. This is supported by the fact that the prop line structural failure FMEA (03-2F-102108-1) lists this failure as a cause. Since this failure could result in line failure and prop leakage, IOA recommends that the current 3/3 FMEAs for the relief device failures be upgraded accordingly.

Three (3) of the FRCS hardware issues are related to this general issue.

4.1.1.A.4 Additional Items and Failure Modes

A number of RCS subsystem items and failure modes identified by IOA during the analysis phase are not covered in the current NASA FMEA/CIL. IOA recommends that these items and failure modes be incorporated into the FMEA/CIL. These issues are identified in Appendix F by issue codes HDW 4 and HDW 5.

Thirty-one (31) of the FRCS hardware issues are related to this general issue.

4.1.1.B EPD&C

IOA has several general EPD&C issues that tend to inflate the number of issues shown in the assessment tables. The following general issues remain unresolved.

4.1.1.B.1 Loss of Talkback Data

IOA considers the loss of data to determine the actual position of a valve to be a 3/2R PPP. Valve position data is provided by the GPC/MDM discretes and the event indicators, which provide redundancy for each other. Loss of all redundancy may lead to falsely failing the valve closed which could effect mission operations. NASA FMEAs have a 3/3 criticality for these failures.

This type of failure mode accounts for 25 open issues shown in the assessment tables for the forward RCS EPD&C (6 issues in the helium pressurization subsystem and 19 in the propellant storage and distribution subsystem). They are identified by issue code EPD&C 1 in Appendix F.

4.1.1.B.2 FMEA Downgrades to 3/3 or 3/2R PPP - NSTS 22206 Interpretations

Numerous issues remain open due to different interpretations of NSTS 22206. All these issues concern the definition of the redundancy string. IOA did not consider multiple or unrelated failures in determining the criticality. IOA considers these FMEAs warrant a 3/2R PPP or 3/3 for the failure mode.

This type of failure mode accounts for 35 open issues shown in the assessment tables for the forward RCS EPD&C (1 issue in the helium pressurization subsystem, 27 issues in the propellant storage and distribution subsystem, and 7 issues in the thruster subsystem). They are identified by issue code EPD&C 2 in Appendix F.

4.1.1.B.3 FMEA Failure Scenario Upgrades - NSTS 22206 Interpretations

These issues also remain open due to the different interpretations of NSTS 22206. All these issues concern the definition of the redundancy string. IOA did not consider multiple or unrelated failures in determining criticality, however, IOA did consider the functional redundancy for the item in question. Based on this, IOA failure scenarios create a 1R or CIL item condition, without using multiple or unrelated failures. IOA recommends these failure scenarios and criticality upgrades be included in the NASA FMEA/CIL.

These failure modes account for 9 open issues in the propellant storage and distribution subsystem as shown in the forward RCS EPD&C assessment tables. They are identified by issue code EPD&C 3 in Appendix F.

4.1.1.B.4 EPD&C Issues Tied to Open IOA Hardware Issues

These issues are directly related to the open IOA hardware issues. These failure modes account for 33 open issues as shown in the assessment tables (1 issue in the helium pressurization subsystem, 21 issues in the propellant storage and distribution subsystem, and 11 in the thruster subsystem). They are identified by issue code EPD&C 4 in Appendix F.

4.1.1.B.5 Additional EPD&C Failure Modes Recommended by IOA

These failure modes are not currently addressed by the NASA FMEA/CIL. IOA recommends these failure modes be incorporated into the FMEA/CIL.

These failures account for 31 open issues shown in the assessment tables for the forward RCS EPD&C (3 issues in the helium pressurization subsystem, 12 issues in the propellant storage and distribution subsystem, 15 issues in the thruster subsystem, and 1 issue in the thermal control subsystem). They are identified by issue code EPD&C 5 in Appendix F.

4.1.2 Specific Forward RCS Issues

The specific forward RCS hardware and EPD&C unresolved issues are presented in the following sections and paragraphs which were referenced in tables I and II. The organization of the sections and paragraphs follow the RCS hierarchy shown in Figures 4-7, and used in tables I and II.

Unresolved issues which are related to general issues discussed in section 4.1.1 contain a reference to the applicable general issue. Each issue is presented in a standard format which gives the failure mode, applicable FMEA number and IOA assessment ID, the NASA and IOA criticality and screen assignments, and the rationale behind the IOA issue. Refer to the detailed assessment sheets in Appendix C for further information on each issue.

4.1.2.1 Helium Pressurization Subsystem (28 issues)

4.1.2.1.A Hardware (16 issues)

4.1.2.1.A.1 Helium Tank Isolation Valves (5 issues)

1) FAILURE: FAILS OPEN

03-2F-101020-3 3/1R PPP

RCS-103 3/1R PFP, CIL

ISSUE: IOA recommends that this failure mode be upgraded to a 3/1R PFP. A failure of the redundant secondary regulator would not be detectable in flight (fail B screen). No way to tell that one level of redundancy has been lost.

2) FAILURE: FAILS CLOSED

03-2F-101020-4 3/1R PPP RCS-104 2/1R PPP, CIL

<u>ISSUE:</u> IOA considers this failure to be a 2/1R. Failure of both valves results in inability to repress prop tank and deplete FRCS propellant. See 4.1.1.A.1.

3) FAILURE: INTERNAL LEAKAGE

NO FMEA RCS-103A 3/1R PFP, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers internal leakage to be a credible failure mode and recommends that it be addressed on the FMEA/CIL. Effects same as "fails open". See issue on 03-2F-101020-3, above.

4) FAILURE: RESTRICTED FLOW

NO FMEA

RCS-10002X 2/1R PFF, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode and recommends that a 2/1R PFF FMEA and CIL be added. Effects same as "failed closed". See issue on 03-2F-101020-4, above, and 4.1.1.A.1. Failure not detectable during dual leg operation (fail B screen). Contamination can affect both valves simultaneously (fail C screen).

5) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-10003X 1/1 ---, CIL

ISSUE: This failure mode is not currently covered on the NASA FMEA/CIL. IOA considers external leakage of the He isol valve due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in loss of helium pressure. See 4.1.1.A.1.

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4.1.2.1.A.2 Regulator Assemblies (4 issues)

1) FAILURE: FAILS CLOSED

03-2F-101030-2 3/1R PPP RCS-112 2/1R PFP, CIL

ISSUE: IOA considers this failure to be a 2/1R PFP. Failure of parallel regulators results in inability to repress prop tank and deplete FRCS propellant. See 4.1.1.A.1. Failure not detectable during dual leg operation (fail B screen).

2) FAILURE: RESTRICTED FLOW

NO FMEA RCS-113 2/1R PFP, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA recommends that restricted flow be addressed as a failure mode for the He regulator. IOA contends that restricted flow is a credible failure mode which should be addressed for components with integral filters and/or orifices. Effects same as "fails closed". See issue on 03-2F-101030-2, above, and section 4.1.1.A. FMEA 03-2F-101030-2 currently lists "partial blockage of pilot screen/sense line" as a cause for a failed closed regulator, however this does not address restricted flow through the regulator.

3) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA

RCS-114 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers external leakage of the He regulator due to a housing failure to be a credible failure mode (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in loss of helium pressure. See 4.1.1.A.1.

4) FAILURE: SENSING PORT LEAKAGE

NO FMEA

RCS-115 3/2R PFP, CIL

ISSUE: This failure mode is not currently addressed on the NASA RCS FMEA/CIL, but is addressed on the NASA OMS FMEA/CIL (03-3-1004-3, sensing port leakage, 3/2R PFP). IOA recommends that this failure mode also be addressed for the RCS regulators, with the same rationale used in the OMS subsystem.

4.1.2.1.A.3 Quad Check Valve Assemblies (4 issues)

<u> Andrewski programmer († 1988)</u>

1) FAILURE: FAILS OPEN, INTERNAL LEAKAGE

03-2F-101095-1 3/3 ---

RCS-119 2/1R PFP, CIL

ISSUE: IOA recommends that this FMEA be upgraded to a 2/1R PFP. IOA contends that, with series check valve poppets failed open or leaking, the contamination of upstream components by prop or prop vapors during a mission could result in loss of prop tank repressurization capability and subsequent inability to use or deplete FRCS prop. See section 4.1.1.A.1. Contamination by prop could cause parallel regulators to fail closed.

2) FAILURE: FAILS CLOSED

03-2F-101095-2 3/1R PFP, CIL RCS-120 2/1R PFP, CIL

ISSUE: IOA considers this failure to be a 2/1R PFP. Failed closed parallel check valve poppets results in inability to repress prop tank and deplete FRCS propellant. See 4.1.1.A.1.

3) FAILURE: BLOCKAGE OF SINGLE INLET FILTER

03-2F-101095-3 2/1R PPP, CIL RCS-10005X 1/1 ---, CIL

<u>ISSUE:</u> This failure mode was added to the FMEA/CIL as a result of an IOA recommendation. However, IOA considers this failure to be a 1/1 since it results in inability to repress prop tank and deplete FRCS prop. See 4.1.1.A.1.

4) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-10006X 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers external leakage of the quad check valve assembly due to a housing failure to be a credible failure mode (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in loss of helium pressurant (see 4.1.1.A.1), and leakage of prop and/or prop vapors (see 4.1.1.A.2).

4.1.2.1.A.4 Quick Disconnect Couplings (3 issues)

1) FAILURE: EXTERNAL LEAKAGE

. _____

03-2F-101091-1 3/1R FFP, CIL RCS-109, 117, 121, 142 3/1R FFP, CIL

ISSUE: IOA recommends that "poppet fails open" be added as a failure mode on this FMEA. This is a credible failure mode and is addressed on other QD coupling FMEAs.

2,3) FAILURE: FAILS TO COUPLE

03-2F-101091-2 3/3 ---03-2F-102150-2 3/3 ---RCS-110, 118, 122, 127, 133, 135, 137, 143, 154, 156 3/3 ---

<u>ISSUE:</u> IOA recommends that "restricted flow" be added as a failure mode on the FMEAs listed. This is a credible failure and is addressed on other QD coupling FMEAs.

4.1.2.1.B EPD&C (12 issues)

4.1.2.1.B.1 Diodes (5 issues)

1) FAILURE: FAILS OPEN

NO FMEA

FRCS-11202 2/1R PFP, CIL

ISSUE: The helium isolation valves have two diodes, one in series with each of the open and close solenoid circuits. Diode failing open prevents further valve movement associated with that circuit (open or close). Redundancy provided by other isolation valve. Loss of this, coupled with the loss of all hardware redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. Note: Issue above is directly related to the schematics. They may be drawn incorrectly. Manifold isolation valve diodes are in parallel.

2) FAILURE: FAILS SHORT

NO FMEA

FRCS-11203 3/3

ISSUE: The helium isolation valves have two diodes, one in series with each of the open and close solenoid circuits. Diode failing high has no effect. IOA-RCS recommends this failure be included in the FMEAs.

3) FAILURE: FAILS SHORT

05-6KF-2252-2 3/1R PFP, CIL

FRCS-321,323 3/3

ISSUE: NASA FMEA considers unrelated failures. IOA-RCS claims this failed short diode alone has no effect. (see 4.1.1.B.2)

4) FAILURE: FAILS OPEN

05-6KF-2267-1 3/3

FRCS-324,326 3/2R PPP

<u>ISSUE:</u> This failure may lead to falsely failing the valve closed. (see 4.1.1.B.1)

5) FAILURE: FAILS SHORT TO GROUND

05-6KF-2252-3 3/1R PFP, CIL FRCS-11211,11212 3/1R PFP, CIL

ISSUE: NASA FMEA considers unrelated failures. IOA-RCS claims this failed short to ground diode causes inability to open the valve manually. Redundancy provided by the GPC/MDM. Loss of all redundancy causes inability to expel propellants to meet CG limits. (see 4.1.1.B.3)

4.1.2.1.B.2 Hybrid Drivers (2 issues)

1) FAILURE: LOSS OF OUTPUT

05-6KF-2201-1 3/3

FRCS-336 3/2R PPP

2) FAILURE: LOSS OF OUTPUT

05-6KF-2201A-1 3/3

FRCS-334 3/2R PPP

ISSUE: Both of these issues concern falsely failing the valve closed. (see 4.1.1.B.1)

4.1.2.1.B.3 Resistor (2 issues)

1) FAILURE: FAILS OPEN

05-6KF-2077-1 3/3

FRCS-348,350,352,354 3/2R PPP

2) FAILURE: FAILS OPEN

05-6KF-2078-1 3/3

FRCS-356 3/2R PPP

ISSUE: Both of these issues concern falsely failing the valve closed. (see 4.1.1.B.1)

4.1.2.1.B.4 Toggle Switches (1 issue)

1) FAILURE: INADVERTENT OPERATION

05-6KF-2026-2 3/1R PPP FRCS-11081,11082 2/1R PPP (fails short), CIL 11083 3/3 (inadvertent operation)

ISSUE: IOA-RCS claims a short across contacts 5,6 causes inability to open one leg of the isolation valve. Redundancy provided by the other leg. Loss of all redundancy causes inability to expel propellants in efforts to meet C.G. limits. Inadvertent operation (switch movement) has no effect.

4.1.2.1.B.5 Microswitches (1 issue)

1) FAILURE: ERRONEOUS OUTPUT

NO FMEA FRCS-11204

3/2R PPP

ISSUE: The helium isolation valve A & B solenoid microswitch provides power to the talkback circuitry. A microswitch failure across the either contact will provide an inaccurate talkback. This may lead to falsely failing the valve closed.

4.1.2.1.B.6 Event Indicators (1 issue)

1) FAILURE: FAILS SHORT TO GROUND OR OPEN

05-6KF-2151-1,2 3/3

FRCS-387 3/2R PPP

ISSUE: This issue concerns falsely failing the valve closed.
(see 4.1.1.B.1)

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4.1.2.2 Propellant Storage and Distribution Subsystem (114 issues)

4.1.2.2.A Hardware (23 issues)

4.1.2.2.A.1 Propellant Tank Acquisition Assembly (1 issue)

1) FAILURE: STRUCTURAL FAILURE, HELIUM PASSAGE, SCREEN DRY-OUT

03-2F-111110-3 1/1 ---, CIL RCS-128 1/1 ---, CIL

ISSUE: IOA recommends that the propellant tank acquisition device components be itemized in the item list or functional description sections to show specifically what is covered by this FMEA (e.g.: upper compartment channels/screens, lower compartment channels/screens, feedout tubes, plenum, bulkhead, etc.). IOA also recommends that the "high G" discussion be removed from the functional description for this FRCS prop tank. The FRCS prop tanks are not designed for high G propellant acquisition.

4.1.2.2.A.2 Pressure Relief Assemblies (3 issues)

1) FAILURE: BURST DISK LEAKAGE

NO FMEA

RCS-140 2/1R PFP, CIL

ISSUE: Internal leakage of the burst disk is a credible failure mode and is not currently addressed on the NASA FMEA/CIL. IOA recommends that this failure mode be added to 03-2F-101060-5 (pressure relief valve assembly, burst disk ruptures prematurely, 2/1R PFP). The failure history of the burst disk includes internal leakage.

2) FAILURE: RESTRICTED FLOW

NO FMEA

RCS-10008X 3/1R FNP, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode for components with integral filters and/or orifices, and recommends that it be addressed for the pressure relief valve. Failure mode can be added to 03-2F-101060-3 (pressure relief valve assembly, burst disk fails to rupture, 3/1R FNP).

3) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-10009X 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. FMEA 03-2F-101060-1 addresses only a bellows failure. IOA considers external leakage of the relief assembly due to a housing failure to be a credible failure mode (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in loss of helium pressurant (see 4.1.1.A.1), and leakage of prop or prop vapors (see 4.1.1.A.2).

4.1.2.2.A.3 Ground Manual Isolation Valve (1 issue)

1) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-146 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers external leakage of the ground manual isolation valve due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in loss of helium pressurant (see 4.1.1.A.1), and leakage of prop and/or prop vapors (see 4.1.1.A.2).

4.1.2.2.A.4 Propellant Tank Isolation Valves (5 issues)

1) FAILURE: RESTRICTED FLOW

03-2F-102120-1 3/1R PPP RCS-148 2/1R PPF, CIL

ISSUE: IOA recommends that this failure mode be upgraded to a 2/1R PPF and placed on a new FMEA, separate from the "fails closed" FMEA. Loss of prop flow through both tank isolation valves would result in inability to perform ET sep and inability to deplete FRCS prop. See 4.1.1.A.1. Contamination could affect both valves simultaneously (fail C screen).

2) FAILURE: FAILS CLOSED

03-2F-102120-1 3/1R PPP RCS-150, 152 2/1R PPP, CIL

ISSUE: IOA recommends that this failure mode be upgraded to a 2/1R. Failure of both FRCS prop tank isol valves results in inability to perform ET sep and inability to deplete FRCS propellant. See 4.1.1.A.1.

3) FAILURE: RELIEF DEVICE FAILS CLOSED

03-2F-102120-3 3/3 ---RCS-10010X 2/1R PNP, CIL

ISSUE: These valves are nominally open during all phases, and will not be closed unless a downstream failure occurs which requires isolation. Therefore, this failure mode is not applicable until another failure occurs. IOA recommends that the FMEA for this failure mode be upgraded to a 2/1R PNP (not a 1/1, since a previous failure is required for the valve to be closed). See 4.1.1.A.3.

4) FAILURE: INTERNAL LEAKAGE

NO FMEA RCS-149A, 151A 3/1R PNP

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers "internal leakage" to be a credible failure mode and recommends that it be added as a failure mode on 03-2F-102120-2 (prop tank isol valves, fails open, 3/1R PNP).

5) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-147 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. FMEA 03-2F-102112-1 addresses only a bellows failure. IOA considers external leakage of a prop tank isolation valve housing to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. This failure would result in leakage of propellant. See 4.1.1.A.2.

4.1.2.2.A.5 Primary Manifold Isolation Valves (4 issues)

1) FAILURE: FAILS CLOSED

03-2F-102110-1 3/1R PPP RCS-158, 162, 166, 170 2/1R PPP, CIL

ISSUE: IOA recommends that this failure mode be upgraded to a 2/1R. Certain combinations of two manifold isolation valves failed closed (#1 & #3, or #2 & #4) would result in loss of yaw jet (null jet) dumping capability and possible inability to deplete FRCS prop. See 4.1.1.A.1.

2) FAILURE: RELIEF DEVICE FAILS CLOSED

03-2F-102110-3 3/3 ---

RCS-10012X 1/1 ---, CIL

<u>ISSUE:</u> These valves are nominally closed during entry. IOA recommends that the FMEA for this failure mode be upgraded to a 1/1. See 4.1.1.A.3

3) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA

RCS-177 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. FMEA 03-2F-102112-1 addresses only a bellows failure. IOA considers external leakage of a primary manifold isolation valve housing to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. This failure would result in leakage of propellant. See 4.1.1.A.2.

4) FAILURE: RESTRICTED FLOW

NO FMEA

RCS-178 2/1R PPP, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode for components with integral filters, and recommends that it be addressed for the primary manifold isolation valves. Effects same as "fails closed". See issue on 03-2F-102110-1, above, and 4.1.1.A.1.

4.1.2.2.A.6 Vernier Manifold Isolation Valves (4 issues)

1) FAILURE: FAILS OPEN, INTERNAL LEAKAGE

03-2F-102170-2 3/2R PPP RCS-173 3/1R PNP

ISSUE: IOA recommends that these failure modes be upgraded to 3/1R PNP. Loss of all redundancy (tank isol valve and thruster valve) results in leakage of propellant. See 4.1.1.A.2.

2) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-177A 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. FMEA 03-2F-102170-3 addresses only a bellows failure. IOA considers external leakage of a vernier manifold isolation valve housing to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. This failure would result in leakage of propellant. See 4.1.1.A.2.

3) FAILURE: RESTRICTED FLOW

NO FMEA RCS-178 2/2 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode for components with integral filters, and recommends that it be addressed for the vernier manifold isolation valves. Effects same as "fails closed". This failure mode can be added to 03-2F-102170-1 (vernier manifold valve, fails closed, 2/2).

4) FAILURE: RELIEF DEVICE FAILS CLOSED

NO FMEA RCS-10014X 2/1R PNP, CIL

ISSUE: This failure mode is not currently addressed for the FRCS vernier manifold isolation valves, however it is addressed for the ARCS vernier manifold valves. This valve is nominally open during all phases, and will not be closed unless a downstream failure occurs which requires isolation. Therefore, this failure mode is not applicable until another failure occurs. IOA recommends that the FMEA for this failure mode be upgraded to a 2/1R PNP (not a 1/1, since a previous failure is required for the valve to be closed). See 4.1.1.A.3.

4.1.2.2.A.7 Jet Alignment Bellows (1 issue)

1) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

03-2F-121308-1 1/1 ---, CIL RCS-179 1/1 ---, CIL

<u>ISSUE:</u> IOA recommends that the "effects" on this FMEA be revised. The current effects state that this failure is "no effect after ET separation". IOA considers leakage of prop to be critical during all phases. See 4.1.1.A.2.

4.1.2.2.A.8 Quick Disconnect Couplings (4 issues)

1) FAILURE: EXTERNAL LEAKAGE

03-2F-101080-1 2/1R FFP, CIL RCS-159, 163, 167, 171, 175 2/1R FFP, CIL

ISSUE: IOA recommends that "poppet fails open" be added as a failure mode on this FMEA. This is a credible failure mode and is addressed on other QD coupling FMEAs.

2) FAILURE: EXTERNAL LEAKAGE

03-2F-101090-1 3/1R FFP, CIL RCS-130 3/1R FFP, CIL

ISSUE: IOA recommends that "poppet fails open" be added as a failure mode on this FMEA. This is a credible failure mode and is addressed on other QD coupling FMEAs.

3,4) FAILURE: FAILS TO COUPLE

03-2F-101080-2 03-2F-101090-2 RCS-160, 164, 168, 172, 176, 131 3/3 ---

ISSUE: IOA recommends that "restricted flow" be added as a failure mode on the FMEAs listed. This is a credible failure and is addressed on other QD coupling FMEAs.

4.1.2.2.B EPD&C (91 issues)

4.1.2.2.B.1 Remote Power Controllers (4 issues)

1) FAILURE: INADVERTENT OPERATION

05-6KF-2177-2 3/1R PFP, CIL FRCS-11019 3/3

ISSUE: NASA FMEA considers multiple failures (close driver failed on, ground driver failed on causing continuous power to the solenoid). IOA-RCS claims this RPC inadvertently operating alone has no effect. (see 4.1.1.B.2)

2) FAILURE: INADVERTENT OPERATION

05-6KF-2178-2

3/1R PFP, CIL

FRCS-11021

3/3

ISSUE: NASA FMEA considers multiple failures (open driver failed on, ground driver failed on causing continuous power to the solenoid). IOA-RCS claims this RPC inadvertently operating alone has no effect. (see 4.1.1.B.2)

3) FAILURE: LOSS OF OUTPUT

05-6KF-2177-1

3/2R P P P

FRCS-11018

3/1R P NA P

ISSUE: This RPC failed open (loss of output) causes inability to close manifold 5 isolation valve. Loss of this, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.4)

4) FAILURE: LOSS OF OUTPUT

05-6KF-2178-1

3/2R PPP

FRCS-11020

2/2, CIL

ISSUE: IOA-RCS claims this RPC failed open (loss of output) causes inability to open the valve. This causes loss of vernier jets required for mission operations. (see 4.1.1.B.4)

4.1.2.2.B.2 Diodes (27 issues)

1) FAILURE: FAILS SHORT

05-6KF-2255-2

3/3

FRCS-573,579,595,601

3/2R PPP

617,623,639,645

2) FAILURE: FAILS OPEN

05-6KF-2268-1

3/3

FRCS-580,582,602,604

3/2R PPP

624,626,646,648

3) FAILURE: FAILS SHORT

05-6KF-2257-2

3/3

FRCS-11037

3/2R PPP

4) FAILURE: FAILS SHORT

05-6KF-2257A-2 FRCS-11039 3/3

3/2R PPP

5) FAILURE: FAILS OPEN

05-6KF-2269-1

3/3

FRCS-11056,11058

3/2R PPP

ISSUE: The first five issues concern falsely failing the valve closed. (see 4.1.1.B.1)

6) FAILURE: FAILS OPEN

05-6KF-2253-1

2/1R PFP, CIL

FRCS-388,406,410,420

3/3

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed open diode alone (causing continuous power to the motor) has no effect. (see 4.1.1.B.2)

7) FAILURE: FAILS OPEN

05-6KF-2253E-1

3/1R PFP, CIL

FRCS-408,418 -

3/3

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed open diode alone (causing continuous power to the motor) has no effect. (see 4.1.1.B.2)

8) FAILURE: FAILS OPEN

05-6KF-2254-1

2/1R PFP, CIL

FRCS-424,442,446,456

3/3

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed open diode alone (causing continuous power to the motor) has no effect. (see 4.1.1.B.2)

9) FAILURE: FAILS OPEN

05-6KF-2255-1 2/1R PFP, CIL

FRCS-572,578,594,600 3/3

616,622,638,644

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed open diode alone (causing continuous power to the motor) has no effect. (see 4.1.1.B.2)

10) FAILURE: FAILS OPEN

05-6KF-2255E-1 3/1R PFP, CIL

FRCS-576,598,620,642 3/3

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed open diode alone (causing continuous power to the motor) has no effect. (see 4.1.1.B.2)

11) FAILURE: FAILS OPEN

05-6KF-2255F-1 3/1R PFP, CIL

FRCS-568,590,612,634 3/3

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed open diode alone (causing continuous power to the motor) has no effect. (see 4.1.1.B.2)

12) FAILURE: FAILS OPEN

05-6KF-2257-1 3/1R PFP, CIL

FRCS-11036 3/3

ISSUE: NASA FMEA considers multiple failures (switch internal short, open driver failed on causing continuous power to the solenoid). IOA-RCS claims this diode failed open alone has no effect. (see 4.1.1.B.2)

13) FAILURE: FAILS OPEN

05-6KF-2257A-1 3/1R PFP, CIL

FRCS-11038 3/3

ISSUE: NASA FMEA considers multiple failures (switch internal short, close driver failed on causing continuous power to the solenoid). IOA-RCS claims this diode failed open alone has no effect. (see 4.1.1.B.2)

14) FAILURE: FAILS SHORT

05-6KF-2257F-2 3/2R PPP FRCS-11065 3/3

ISSUE: NASA FMEA considers multiple failures (switch fails short, circuit breaker failed on causing continuous power to the solenoid). IOA-RCS claims this diode failed short has no effect. (see 4.1.1.B.2)

15) FAILURE: FAILS SHORT

05-6KF-2255E-2 3/1R PFP, CIL FRCS-577,599,621,643 2/1R PFP, CIL

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed short diode causes excessive motor operation (continuous power that opens the valve slightly (3 degrees) then closes it, constantly repeating itself). Motor damage would likely cause the valve to close, causing loss of jets on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes the inability to expel propellants in efforts to meet C.G. limits. (see 4.1.1.B.3, 4.1.1.B.4)

16) FAILURE: FAILS SHORT

05-6KF-2255F-2- 3/1R PFP, CIL FRCS-569,591,613,635 2/1R PFP, CIL

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed short diode causes excessive motor operation (continuous power that opens the valve slightly (3 degrees) then closes it, constantly repeating itself). Motor damage would likely cause the valve to close, causing loss of jets on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes the inability to expel propellants in efforts to meet C.G. limits. (see 4.1.1.B.3, 4.1.1.B.4)

17) FAILURE: FAILS OPEN

05-6KF-2253B-1 3/2R P P P FRCS-398,400 3/1R P NA P

ISSUE: IOA-RCS claims this failed open diode causes inability to open the valve with the GPC/MDM. Manual commanding provides redundancy. Loss of this, coupled with the loss of all hardware redundancy causes inability to expel propellants in efforts to meet C.G. limits.

18) FAILURE: FAILS OPEN

05-6KF-2254B-1 3/2R P P P FRCS-434,436 3/1R P NA P

ISSUE: IOA-RCS claims this failed open diode causes inability to open the valve with the GPC/MDM. Manual commanding provides redundancy. Loss of this, coupled with the loss of all hardware redundancy causes inability to expel propellants in efforts to meet C.G. limits.

19) FAILURE: FAILS OPEN

05-6KF-2255B-1 3/2R P P P FRCS-574,596,618,640 3/1R P NA P

ISSUE: This diode failed open causes inability to open the valve with the GPC/MDM. Redundancy provided by manual commanding. Loss of this causes loss of jets on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits.

20) FAILURE: FAILS OPEN

05-6KF-2257D-1 3/2R P P P FRCS-11044,11060 3/1R P NA P

ISSUE: This diode failed open causes inability to close isolation valve manually. GPC/MDM close command provides redundancy. Loss of this, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.4)

21) FAILURE: FAILS OPEN

05-6KF-2257F-1 3/2R P P P FRCS-11064 3/1R P NA P

ISSUE: This diode failed open causes inability to inhibit the ground driver manually to close the valve. Redundancy provided with the GPC/MDM commands. Loss of this, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.4)

22) FAILURE: FAILS OPEN

3/2R PPP 05-6KF-2258-1 FRCS-11070 2/2, CIL

ISSUE: IOA-RCS claims this failed open diode causes inability to open valve. This causes loss of vernier jets required for mission operations. (see 4.1.1.B.4)

FAILURE: FAILS SHORT TO GROUND 23)

3/2R PPP • 05-6KF-2258-3 2/2, CIL FRCS-11221

IOA-RCS claims this failed short to ground diode causes inability to open valve. This causes loss of vernier jets required for mission operations. (see 4.1.1.B.4)

24,25) FAILURE: FAILS OPEN

NO FMEA

3/1R P NA P FRCS-11072,11074

<u>ISSUE:</u> The manifold isolation valve has two diodes in parallel that completes the circuit to ground. One diode failing open has no effect. Second diode failing open will causes inability to close the valve. Loss of this, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.5)

26,27) FAILURE: FAILS SHORT

NO FMEA

FRCS-11073,11075 3/3

The manifold isolation valve has two diodes in parallel that completes the circuit to ground. Either or both diode failing short has no effect. (see 4.1.1.B.5)

4.1.2.2.B.3 Hybrid Drivers (20 issues)

1) FAILURE: LOSS OF OUTPUT

05-6KF-2206-1 3/3

FRCS-460,462 3/2R PPP

2) FAILURE: INADVERTENT OPERATION

05-6KF-2206-2 3/3

FRCS-461,463 3/2R PPP 3) FAILURE: LOSS OF OUTPUT

05-6KF-2207-1

3/3

FRCS-464,464

3/2R PPP

4) FAILURE: INADVERTENT OPERATION

05-6KF-2207-2

3/3

FRCS-465,467

3/2R PPP

<u>ISSUE:</u> The first four issues concern falsely failing the valve closed. (see 4.1.1.B.1)

5) FAILURE: LOSS OF OUTPUT

05-6KF-2208-1

2/1R PFP, CIL

FRCS-668,670,672,674,676,678,680,682

3/2R PPP

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed open driver causes loss of accurate indication of the valve status from the event indicator. GPC/MDM microswitch discretes provide redundancy. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.1.1.B.2)

6) FAILURE: INADVERTENT OPERATION

05-6KF-2113A-2

3/1R PFP, CIL

FRCS-11033

3/3

ISSUE: NASA FMEA contains multiple failures (open driver failed on, ground driver failed on causing continuous power to the solenoid). IOA-RCS claims this driver inadvertently operating has no effect. (see 4.1.1.B.2)

7) FAILURE: LOSS OF OUTPUT

05-6KF-2210-1

3/1R PFP, CIL

FRCS-11024

3/2R PPP

ISSUE: NASA FMEA considers multiple failures (switch short, ground driver failed on causing continuous power to the solenoid). IOA-RCS claims this driver failed open (loss of output) causes loss of event indicator to determine valve status. GPC/MDM discretes provide redundancy. Loss of all redundancy may lead to falsely failing the valve close causing loss of mission operations. (see 4.1.1.B.2)

8) FAILURE: LOSS OF OUTPUT

05-6KF-2210A-1 3/1R PFP, CIL

FRCS-11022 3/2R PPP

ISSUE: NASA FMEA considers multiple failures (switch short, ground driver failed on causing continuous power to the solenoid). IOA-RCS claims this driver failed open (loss of output) causes loss of event indicator to determine valve status. GPC/MDM discretes provide redundancy. Loss of all redundancy may lead to falsely failing the valve close causing loss of mission operations. (see 4.1.1.B.2)

9) FAILURE: INADVERTENT OUTPUT

05-6KF-2211-2 3/1R PFP, CIL

FRCS-11031 3/3

ISSUE: NASA FMEA considers multiple failures (open driver failed on, ground driver failed on causing continuous power to the solenoid). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.1.1.B.2)

10) FAILURE: INADVERTENT OUTPUT

05-6KF-2213-2 3/1R PFP, CIL

FRCS-11027_ 3/3

ISSUE: NASA FMEA considers multiple failures (close driver failed on, ground driver failed on causing continuous power to the solenoid). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.1.1.B.2)

11) FAILURE: INADVERTENT OUTPUT

05-6KF-2224-2 3/1R PFP, CIL

FRCS-11035 3/3

ISSUE: NASA FMEA considers multiple failures (type I open driver failed on, type III open driver failed on causing continuous power to the solenoid). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.1.1.B.2)

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12) FAILURE: INADVERTENT OUTPUT

05-6KF-2212-2 3/1R PFP, CIL

FRCS-11029 2/2, CIL

ISSUE: NASA FMEA contains multiple failures (ground driver failed on causing continuous power to the solenoid). This driver failed high causes inability to open the isolation valve. This causes loss of verniers thus mission objectives. (see 4.1.1.B.3)

13) FAILURE: INADVERTENT OUTPUT

05-6KF-2208-2 3/1R PPP

FRCS-669,673,677,681 2/1R PPP (open driver), CIL

671,675,679,683 3/1R PPP (close driver)

ISSUE: This driver failed short causes inability to open the valve. This causes loss of jets on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. Close driver failed short causes inability to isolate a thruster leak. (see 4.1.1.B.4)

14) FAILURE: INADVERTENT OUTPUT

05-6KF-2210-2 3/2R PPP FRCS-11025. 2/2, CIL

ISSUE: IOA-RCS claims this failed short driver causes inability to open the valve. This causes loss of vernier jets required for mission operations. (see 4.1.1.B.4)

15) FAILURE: INADVERTENT OUTPUT

05-6KF-2210A-2 3/2R PPP FRCS-11023 3/1R PPP

<u>ISSUE:</u> This driver failed short causes inability to close isolation valve. Loss of this, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.4)

16) FAILURE: LOSS OF OUTPUT

05-6KF-2211-1 3/2R PPP FRCS-11030 2/2, CIL

<u>ISSUE:</u> IOA-RCS claims this failed open driver (loss of output) causes inability to open the valve. This causes loss of vernier jets required for mission operation. (see 4.1.1.B.4)

17) FAILURE: LOSS OF OUTPUT

05-6KF-2212-1 3/2R P P P FRCS-11028 3/1R P NA P

ISSUE: This driver failed open (loss of output) causes inability to close the isolation valve. Loss of this, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.4)

18) FAILURE: LOSS OF OUTPUT

05-6KF-2213-1 3/2R P P P FRCS-11026 3/1R P NA P

ISSUE: This driver failed open (loss of output) causes inability to close the isolation valve. Loss of this, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.4)

19) FAILURE: LOSS OF OUTPUT

05-6KF-2113A-1 3/2R PPP FRCS-11032 2/2, CIL

ISSUE: IOA-RCS claims this failed open driver causes inability to open the valve. This causes loss of vernier jets required for mission operations. (see 4.1.1.B.4)

20) FAILURE: LOSS OF OUTPUT

05-6KF-2224-1 3/2R PPP FRCS-11034 2/2, CIL

<u>ISSUE:</u> This driver failed open (loss of output) causes inability to open the isolation valve. Inability to open this valve causes loss of verniers thus loss of mission. (see 4.1.1.B.4)

4.1.2.2.B.4 Fuses (1 issue)

FAILURE: FAILS OPEN

05-6KF-2006-1 3/2R P P P FRCS-11001,11002 3/1R P NA P

ISSUE: This fuse failed open causes inability to close the valve manually. Redundancy provided with the GPC/MDM commands. Loss of this, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.2)

4.1.2.2.B.5 Relays (9 issues)

1) FAILURE: INADVERTENT OUTPUT

05-6KF-2126-2 2/1R PFP, CIL FRCS-473,479 3/1R PFP, CIL

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed closed relay causes inability to close the valve. This, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.3)

2) FAILURE: INADVERTENT OUTPUT

05-6KF-2126A-2 3/1R PFP, CIL FRCS-475,481, 3/3 477,483 2/1R PFP, CIL

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed closed relay causes inability to open the valve. This causes loss of jets on manifolds 1 & 2. Redundancy provided by jets on manifolds 3 & 4. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. First in a series relay failing closed has no effect (475,481). (see 4.1.1.B.3, 4.1.1.B.4)

3) FAILURE: INADVERTENT OUTPUT

05-6KF-2127-2 2/1R PFP, CIL FRCS-487,493 3/3 489,495 2/1R PFP, CIL

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed closed relay causes inability to open the valve. This causes loss of jets on manifolds 3,4 & 5. Redundancy provided by jets on manifolds 1 & 2. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. First series relay failing closed has no effect (487,493). No redundancy for vernier jets on manifold 5 (2/2). (see 4.1.1.B.3, 4.1.1.B.4)

4) FAILURE: INADVERTENT OUTPUT

05-6KF-2127A-2 2/1R PFP, CIL FRCS-485,491 2/1R PFP, CIL

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed closed relay causes inability to open the valve. This causes loss of jets on manifolds 3,4 & 5. Redundancy provided by jets on manifolds 1 & 2. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. No redundancy for vernier jets on manifold 5 (2/2). (see 4.1.1.B.3, 4.1.1.B.4)

5) FAILURE: FAILS TO TRANSFER (LOSS OF OUTPUT)

05-6KF-2127A-1 3/1R PPP FRCS-484,490 2/1R PFP, CIL

ISSUE: This relay failing to transfer inability to open the 3/4/5 valve. This causes loss of jets on manifolds 3,4, & 5. Redundancy for jets on manifolds 3 & 4 provided on manifolds 1 & 2. Loss of all redundancy causes loss of jets required for to expel propellants in efforts to meet C.G. limits. No redundancy provided for manifold 5 (verniers - 2/2). (see 4.1.1.B.3)

6) FAILURE: INADVERTENT OPERATION

05-6KF-2128-2 2/1R PFP, CIL FRCS-705,709,713,717 2/1R PPP, CIL

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this close relay inadvertently operating causes inability to open the valve causing loss of jets on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes inability to expel propellants in efforts to meet C.G. limits. (see 4.1.1.B.3, 4.1.1.B.4)

7) FAILURE: INADVERTENT OUTPUT

05-6KF-2128A-2 2/1R PFP, CIL FRCS-703,707,711,715 3/1R PFP, CIL

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this open relay failed closed causes inability to close the valve. This, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.3)

8) FAILURE: FAILS TO TRANSFER (LOSS OF OUTPUT)

05-6KF-2126-1

3/1R PPP

FRCS-472,478

2/1R PPP, CIL

ISSUE: IOA-RCS claims this relay failing to transfer causes inability to open the valve. This causes loss of jets on manifolds 1 & 2. Redundancy provided by jets on manifolds 3 & 4. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. (see 4.1.1.B.4)

9) FAILURE: FAILS TO TRANSFER (LOSS OF OUTPUT)

05-6KF-2128A-1

3/1R PPP

FRCS-702,706,710,714

2/1R PPP, CIL

ISSUE: This relay failing to transfer causes inability to open isolation valve. This causes loss of jets on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. (see 4.1.1.B.4)

4.1.2.2.B.6 Resistors (10 issues)

1) FAILURE: FAILS OPEN

05-6KF-2081-1

3/3

FRCS-502,506,5<u>1</u>0,512

3/2R PPP

2) FAILURE: FAILS OPEN

05-6KF-2082-1

3/3

FRCS-504,508

3/2R PPP

3) FAILURE: FAILS SHORT TO GROUND OR OPEN

05-6KF-2153-1,2

3/3

FRCS-879

3/2R PPP

4) FAILURE: FAILS OPEN

05-6KF-2085-1

3/3

FRCS-522,526

3/2R PPP

5) FAILURE: FAILS OPEN

05-6KF-2086-1

3/3

FRCS-520,524,528,530

3/2R PPP

6) FAILURE: FAILS OPEN

05-6KF-2091-1 3/3 FRCS-11012,11013,11014,11015 3/2R PPP

<u>ISSUE:</u> The first six issues concern falsely failing the valve closed. (see 4.1.1.B.1)

7) FAILURE: FAILS OPEN

05-6KF-2083-1 3/1R PFP, CIL FRCS-496,498,500 3/2R PPP

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed open resistor causes loss of accurate indication of the valve status from the event indicator or the GPC/MDM microswitch discretes. This may lead to falsely failing the valve closed. (see 4.1.1.B.2)

8) FAILURE: FAILS OPEN

05-6KF-2084-1 3/1R PFP, CIL FRCS-514,516,518 3/2R PPP

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed open resistor causes loss of accurate indication of the valve status from the event indicator or GPC/MDM microswitch discretes. This may lead to falsely failing the valve closed. (see 4.1.1.B.2)

9) FAILURE: FAILS OPEN

05-6KF-2089-1 2/1R PFP, CIL FRCS-718,732,746,760 3/2R PPP

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed open resistor causes loss of accurate indication of the valve status from the event indicator or GPC/MDM microswitch discretes. This may lead to falsely failing the valve closed. (see 4.1.1.B.2)

10) FAILURE: FAILS OPEN

05-6KF-2090-1 3/1R PFP, CIL

FRCS-11008 3/2R PPP

ISSUE: NASA FMEA considers multiple failures (ground driver failed on causing continuous power to the solenoid). IOA-RCS claims this failed open resistor causes loss of accurate talkback. This may lead to falsely failing the valve closed causing loss of mission operations. (see 4.1.1.B.2)

4.1.2.2.B.7 Toggle Switches (3 issues) -

1) FAILURE: INADVERTENT OPERATION

05-6KF-2032-2 3/1R PFP, CIL FRCS-11005,11007 3/1R PFP, CIL

ISSUE: NASA FMEA contains multiple failures (open driver failed on, causing continuous power to the solenoid). The switch inadvertently operating causes inability to close the valve. This, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.3)

2) FAILURE: FAILS TO CONDUCT ONE OR MORE CONTACT SET

05-6KF-2032-1 3/2R P P P FRCS-11003,11004,11006 3/1R P NA P

ISSUE: This switch failed open causes inability to close the valve manually. Redundancy provided with the GPC/MDM commands. Loss of this, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.3)

3) FAILURE: SWITCH FAILS SHORT

05-6KF-2030-2 3/1R PPP FRCS-11096,11097,11101,11102 2/1R PFP, CIL 11106,11107,11111,11112

ISSUE: Switch short across close contacts causes inability to open the valve. Inability to open the valve coupled with the loss of all hardware redundancy may causes loss of jets required to expel propellants to meet CG limits. (see 4.1.1.B.3)

4.1.2.2.B.8 Microswitches (8 issues)

1) FAILURE: ERRONEOUS OUTPUT

NO FMEA FRCS-11205

3/1R PPP

ISSUE: The tank isolation valve 1/2 solenoid microswitch provides power to the talkback circuitry and to the relay inhibit. A microswitch failure across the close contacts while the valve is open causes inability to close the valve. This, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.4.8.5)

2) FAILURE: ERRONEOUS OUTPUT

NO FMEA FRCS-11206

3/1R PPP

ISSUE: The tank isolation valve 3/4/5 solenoid microswitch provides power to the talkback circuitry and to the relay inhibit. A microswitch failure across the close contacts while the valve is open causes inability to close the valve. This, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.1.1.B.5)

3-6) FAILURE: ERRONEOUS OUTPUT

NO FMEA

FRCS-11207,11208,

3/2R PPP

11209,11210

ISSUE: The manifold isolation valve solenoid microswitch provides power to the talkback circuitry and to the relay inhibit. A microswitch failure across the either contacts will provide an inaccurate talkback. This may lead to falsely failing the valve closed. (see 4.1.1.B.5)

7-8) FAILURE: ERRONEOUS OUTPUT

NO FMEA

FRCS-11078,11079

3/2R PPP

ISSUE: The manifold isolation valve solenoid microswitch provides power to the talkback circuitry. A microswitch failure across the either contact will provide an inaccurate talkback. This may lead to falsely failing the valve closed. (see 4.1.1.B.5)

4.1.2.2.B.9 Circuit Breaker (1 issue)

1) FAILURE: SHORT, FAILED CLOSED

05-6KF-2280-2

3/1R PFP, CIL

FRCS-11077

3/3

ISSUE: NASA FMEA considers multiple failures (switch jam, open driver failed on causing continuous power to the solenoid). IOA-RCS claims this circuit breaker failed short alone has no effect. (see 4.1.1.B.2)

4.1.2.2.B.10 Meters / Rotary Switch (2 issues)

1) FAILURE: All Credible Modes

05-6KF-2158-1

3/3

FRCS-11193,11194

3/2R PPP

2) FAILURE: All Credible Modes

05-6KF-2034-1

3/3

FRCS-11191

3/2R PPP

ISSUE: Both of these issues concern falsely failing the valve closed due to inaccurate switch or meter data. (see 4.1.1.B.1)

4.1.2.2.B.11 Event Indicators (6 issues)

1) FAILURE: FAILS SHORT TO GROUND OR OPEN

05-6KF-2154-1,2

3/3

FRCS-879

3/2R PPP

2) FAILURE: FAILS SHORT TO GROUND OR OPEN

05-6KF-2155-1,2

3/3

FRCS-879A

3/2R PPP

3) FAILURE: FAILS OPEN

05-6KF-2155-2

3/3

FRCS-880A,881A,882A,883A

3/2R PPP

4) FAILURE: FAILS OPEN

05-6KF-2156-2

3/3

FRCS-11016

3/2R PPP

ISSUE: The first four issues concern falsely failing the valve closed. (see 4.1.1.B.1)

5) FAILURE: FAILS SHORT TO GROUND

05-6KF-2155-1 FRCS-880,881,882,883 2/1R PFP, CIL 3/2R PPP -

ISSUE: NASA FMEA considers multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failed short to ground event indicator causes loss of accurate indication of the valve status from the display. GPC/MDM microswitch discretes provide redundancy. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.1.1.B.2)

6) FAILURE: FAILS SHORT TO GROUND

05-6KF-2156-1

3/1R PFP, CIL

FRCS-11017

3/2R PPP

ISSUE: NASA FMEA considers multiple failures (ground driver failed on causing continuous power to the solenoid). IOA-RCS claims this event indicator failed short to ground causes loss of accurate indication of valve status from event indicator. Redundancy provided by GPC/MDM discretes. Loss of all redundancy may lead to falsely failing the valve closed causing loss of mission operations. (see 4.1.1.B.2)

- 4.1.2.3 Thruster Subsystem (41 issues)
- 4.1.2.3.A Hardware (10 issues)
- 4.1.2.3.A.1 Primary Thruster Bipropellant Solenoid Valves (6 issues)
- 1) FAILURE: PREMATURE OPERATION
 (DURING GROUND C/O TRICKLE CURRENT TEST)

03-2F-121310-1 3/3 ---RCS-10116X 1/1 ---, CIL

ISSUE: IOA considers a premature (unexpected) firing of an RCS thruster during ground operations and testing to be a 1/1 failure. Such a failure could result in loss of life due to exposure to prop vapors and/or thruster plume. This failure is the result of a reaction jet driver (RJD) failure. A "failed-on" thruster caused by an RJD failure is covered in the GNC subsystem.

2) FAILURE: FAILS OPEN, INTERNAL LEAKAGE

03-2F-121310-2 3/1R FPP, CIL RCS-181 1/1 ---, CIL (Fails open) RCS-185, 187, 189 1/1 ---, CIL (Internal leakage)

ISSUE: A thruster biprop valve failed open or leaking due to piece-part structural failure or seal failure results in leakage of propellant. See 4.1.1.A.2. Such a failure could also result in zots upon subsequent thruster use.

3) FAILURE: FAILS CLOSED (ONE OR BOTH VALVES)

03-2F-121310-3 3/1R FPP, CIL (All FRCS thrusters)
RCS-184 3/2R FPP, CIL (-X axis)
RCS-186 2/1R FPP, CIL (+/-Y axis)
RCS-188 3/1R FPP, CIL (-Z axis)
RCS-10015X 3/2R FPP, CIL (+Z axis)

ISSUE: IOA recommends that the FRCS primary thrusters be separated by axis since the failure of thrusters in each axis can have different effects. IOA considered thrusters which fire in the same direction to be redundant to each other. Loss of all jets in the -X axis could result in loss of mission only. -X thrusters are not required for ET sep or FRCS prop dumping. Loss of both +Y or both -Y thrusters after the deorbit burn would result in loss of yaw jet (null jet) dumping capability and possible inability to deplete FRCS propellant. See 4.1.1.A.1. Loss of all -Z thrusters on the same side could result in inability to perform ET sep. Loss of all +Z thrusters could

result in loss of mission only. +Z thrusters are not required for ET sep or FRCS prop dumping. IOA recommends either that this FMEA be separated into four new FMEAs, or that this FMEA be upgraded to a 2/1R FPP to cover the worst case.

4) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-182 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers external leakage of the primary thruster biprop solenoid valves assembly due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in leakage of propellant. See 4.1.1.A.2.

5) FAILURE: RESTRICTED FLOW

NO FMEA RCS-183 2/1R FPP, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode for components with integral filters, and recommends that it be addressed for the thruster biprop valves. Effects same as "failed closed". See issue on 03-2F-121310-3, above, and 4.1.1.A.1.

6) FAILURE: DELAYED OPERATION, ONE VALVE OPENS SLOWLY OR LATE

NO FMEA RCS-10042X 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers the delayed opening of one biprop valve relative to the other to be a credible failure which should be addressed. Such a failure of the oxidizer valve could result in fuel migration into the oxidizer injector tube and detonation within the tube upon oxidizer flow (zots). Rupture of the valve assembly due to jet zots would result in leakage of propellant. See 4.1.1.A.2. IOA recommends that a 1/1 FMEA be generated for this failure mode.

4.1.2.3.A.2 Primary Thruster Injector Head Assembly (2 issues)

1) FAILURE: RESTRICTED FLOW

NO FMEA

RCS-10018X 1/1 ---, CIL

ISSUE: This item is not currently addressed on the NASA FMEA/CIL. However, a note on 03-2F-121312-1 states that the injector FMEA was deleted and added as a cause on 121312-1. IOA considers the injector assembly to be at the same level of detail as other primary thruster components on the FMEA/CIL, and recommends that a separate 1/1 FMEA be regenerated for this item and failure mode. This will ensure that this critical failure gets the proper amount of attention. Restricted flow leading to an improper mixture ratio or inadequate cooling would probably result in loss of the thruster, and could result in combustion chamber or nozzle extension burn-through.

2) FAILURE: STRUCTURAL FAILURE, BURN-THROUGH

NO FMEA RCS-10019X 1/1 ---, CIL

ISSUE: This item is not currently addressed on the NASA FMEA/CIL. However, a note on 03-2F-121312-1 states that the injector FMEA was deleted and added as a cause on 121312-1. IOA considers the injector assembly to be at the same level of detail as other primary thruster components on the FMEA/CIL, and recommends that a separate 1/1 FMEA be regenerated for this item and failure mode. This will ensure that this critical failure gets the proper amount of attention. Such a failure of the injector head assembly could result in a fire/explosion potential leading to possible damage to the vehicle.

4.1.2.3.A.3 Vernier Thruster Assembly (2 issues)

1) FAILURE: FAILS OPEN, INTERNAL LEAKAGE

03-2F-131310-2 2/2 ---, CIL RCS-192 1/1 ---, CIL (Fails open) RCS-195 1/1 ---, CIL (Internal leakage)

<u>ISSUE:</u> A thruster biprop valve failed open or leaking due to piece-part structural failure or seal failure results in leakage of propellant. See 4.1.1.A.2.

2) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-194 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers external leakage of the vernier thruster biprop valve assembly due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in leakage of propellant. See 4.1.1.A.2.

4.1.2.3.B EPD&C (31 issues)

4.1.2.3.B.1 Remote Power Controllers (5 issues)

1) FAILURE: INADVERTENT OPERATION

05-6KF-2179-2 3/1R PFP, CIL

FRCS-886,890,894,901 3/3

ISSUE: NASA FMEA considers multiple failures (RJD bus relays fail on, RJD fails on, manifold isolation valve failed, tank isolation valve failed, main bus off, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this RPC inadvertently operating alone has no effect. (see 4.1.1.B.2)

2) FAILURE: INADVERTENT OPERATION

05-6KF-2183-2 3/2R PFP, CIL

FRCS-906,908 3/3

ISSUE: NASA FMEA considers multiple failures (RPC failed, spurious RJD command, manifold isolation valve failed, tank isolation valve failed, main bus fails on, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this RPC inadvertently operating alone has no effect. (see 4.1.1.B.2)

3) FAILURE: LOSS OF OUTPUT

05-6KF-2179-1 3/1R PPP

FRCS-885,889,904 2/1R PPP, CIL

893 3/1R PPP (manifold 3)

ISSUE: IOA-RCS claims this failed open RPC causes loss of driver power, thus jets, on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. Manifold 3 has electrical redundancy for driver power (893). (see 4.1.1.B.4)

4) FAILURE: LOSS OF OUTPUT

05-6KF-2180-1 3/1R PPP

FRCS-887,891,902 2/1R PPP, CIL

895 3/1R PPP (manifold 3)

ISSUE: IOA-RCS claims this failed open RPC causes loss of logic power, thus jets, on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. Manifold 3 has electrical redundancy for logic power (895). (see 4.1.1.B.4)

5) FAILURE: INADVERTENT OPERATION

05-6KF-2182-2 3/1R PPP

FRCS-900 3/3

ISSUE: NASA FMEA considers multiple failures. IOA-RCS claims this failure alone has no effect. (see 4.1.1.B.2)

4.1.2.3.B.2 Diode (7 issues)

1) FAILURE: FAILS OPEN

05-6KF-2259-1 3/1R PFP, CIL FRCS-913,919,941 2/1R PPP, CIL

925,931 _ 3/1R PPP (manifold 3)

ISSUE: IOA-RCS claims this failed open diode causes loss of driver power, thus jets, on associated manifold. Redundancy provided by jets on another manifold. Loss of all hardware redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. Manifold 3 has additional electrical redundancy (925,931). (see 4.1.1.B.4)

2) FAILURE: FAILS OPEN

05-6KF-2260-1 3/1R PFP, CIL

FRCS-909,915,943 2/1R PPP (1/1 ABORT), CIL

921,927 3/1R PPP (manifold 3)

ISSUE: IOA-RCS claims this failed open diode causes loss of driver power, thus jets, on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. Loss of one yaw thruster during RTLS/TAL abort could result in inability to complete a propellant dump. Manifold 3 has electrical redundancy (921,927). (see 4.1.1.B.4)

3-7) FAILURE: FAILS SHORT TO GROUND

NO FMEA

2/1R PFP, CIL FRCS-11213,11214,11217

3/1R PFP (manifold 3), CIL 11215,11216

Diode failed short to ground causes loss of jets on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. Manifold 3 has electrical redundancy for driver power (FMEA for fail open and fail short on 05-6KF-2260-1, -2). (see 4.1.1.B.4)

4.1.2.3.B.3 Hybrid Drivers (3 issues)

1) FAILURE: INADVERTENT OPERATION

3/2R PFP, CIL 05-6KF-2220-2

3/3 FRCS-958

NASA FMEA considers multiple failures (RPC failed, ISSUE: spurious RJD command, manifold isolation valve failed, tank isolation valve failed, main bus fails on, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.1.1.B.2)

FAILURE: LOSS OF OUTPUT 2)

05-6KF-2214-1 3/1R PFP, CIL 2/1R PPP, CIL FRCS-947,949,956

3/1R PPP (manifold 3) 951,953

IOA-RCS claims this failed open driver causes loss of ISSUE: driver power, thus jets, on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. Electrical redundancy provided for manifold 3 (951,953). (see 4.1.1.B.4)

FAILURE: INADVERTENT OPERATION 3)

3/1R PFP, CIL 05-6KF-2214-2 FRCS-948,950,952,954,955 3/3

NASA FMEA considers multiple failures (RJD bus relays fail on, RJD fails on, manifold isolation valve failed, tank isolation valve failed, main bus off, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this relay inadvertently operating alone has no effect. (see 4.1.1.B.2)

4.1.2.3.B.4 Fuses (3 issues)

1) FAILURE: FAILS OPEN

05-6KF-2009-1 3/2R PPP

FRCS-959,962,965 2/1R PPP, CIL

ISSUE: This fuse failed open causes loss of energy to supply driver power to associated relay. Relay "A" provides energy to manifolds 1 & 3. Relay "B" provides energy to manifold 2. Relay "C" provides energy to manifolds 3 & 4. Loss of relay causes loss of jets on associated manifold. Redundancy provided by jets on another manifold. Loss of all hardware redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. (see 4.1.1.B.4)

2) FAILURE: FAILS OPEN

05-6KF-2007-1 3/1R PPP

FRCS-961,964,967, 2/1R PPP, CIL

969 3/1R PPP (manifold 4)

ISSUE: IOA-RCS claims this failed open fuse causes loss of logic power, thus jets, on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. Manifold 4 has electrical redundancy for logic power after ascent (969). (see 4.1.1.B.4)

3) FAILURE: FAILS OPEN

05-6KF-2008-1 3/1R PPP

FRCS-960,963,966,970 2/1R PPP, CIL

ISSUE: IOA-RCS claims this failed open fuse causes loss driver power, thus jets, on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. (see 4.1.1.B.4)

4.1.2.3.B.5 Relays (2 issues)

1) FAILURE: INADVERTENT OPERATION

05-6KF-2130-2 3/1R PPP

FRCS-973,975,977 3/3

ISSUE: NASA FMEA considers multiple failures (RPC fails on, RJD fails on, manifold isolation valve failed, tank isolation valve failed, main bus off, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this relay inadvertently operating alone has no effect. (see 4.1.1.B.2)

2) FAILURE: FAILS TO TRANSFER

05-6KF-2130-1 3/1R PPP

FRCS-972,974,976 2/1R PPP, CIL

ISSUE: IOA-RCS claims this failed open relay causes loss of driver power, thus jets, on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. (see 4.1.1.B.4)

4.1.2.3.B.6 Resistors (1 issue)

1) FAILURE: FAILS SHORT

NO FMEA FRCS-1035

3/3

ISSUE: The RLR42 resistors have been changed to the RWR80 resistors which can short. IOA-RCS recommends this failure be included into the FMEAs. (the open failure mode for this resistor is on 05-6KF-2111-1).

4.1.2.3.B.7 Toggle Switches (5 issues)

1) FAILURE: INADVERTENT OPERATION

05-6KF-2036-2 3/1R PPP FRCS-11121,11122,11123,11131 3/3

11132,11133,11141,11142, 11143,11151,11152,11153

ISSUE: NASA FMEA considers multiple failures (RJD fails on, manifold isolation valve failed, tank isolation valve failed, main bus off, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this switch inadvertently operating alone has no effect. (see 4.1.1.B.2)

2) FAILURE: INADVERTENT OPERATION

05-6KF-2041-2 3/2R PFP, CIL FRCS-11156,11157,11158 3/3

ISSUE: NASA FMEA considers multiple failures (spurious RJD command, manifold isolation valve failed, tank isolation valve failed, main bus fails off, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this switch inadvertently operating alone has no effect. (see 4.1.1.B.2)

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3) FAILURE: FAILS TO CONDUCT ONE OR MORE CONTACT SET

05-6KF-2035-1 3/1R PPP FRCS-11115,11119,11125, 2/1R PPP, CIL 11129,11135,11139 11145,11149 3/1R PPP (manifold 4)

ISSUE: IOA-RCS claims this failed open toggle switch causes loss of logic power, thus jets, on associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. Manifold 4 has electrical redundancy for logic power after ascent (11145,11149). (see 4.1.1.B.4)

4) FAILURE: FAILS TO CONDUCT ONE OR MORE CONTACT SET

05-6KF-2036-1 3/1R PPP FRCS-11120,11124,11130,11134 2/1R PPP, CIL 11140,11144,11150,11154

ISSUE: IOA-RCS claims this failed open toggle switch causes loss of driver power, thus jets, for associated manifold. Redundancy provided by jets on another manifold. Loss of all redundancy causes loss of jets required to expel propellants in efforts to meet C.G. limits. (see 4.1.1.B.4)

5) FAILURE: INADVERTENT OPERATION

05-6KF-2035-2 3/1R PPP FRCS-11126,11127,11128,11116 3/3 11117,11118,11136,11137, 11138,11146,11147,11148

ISSUE: NASA FMEA considers multiple failures (RJD fails on, manifold isolation valve failed, tank isolation valve failed, main bus off, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this switch inadvertently operating alone has no effect. (see 4.1.1.B.2)

4.1.2.3.B.8 Signal Conditioners (1 issue)

1) FAILURE: ERRONEOUS OR LOSS OF OUTPUT

NO FMEA FRCS-11196 3/2R PFP, CIL

ISSUE: The OF3 signal conditioner routes data for the helium oxidizer tank pressure data. This may causes loss of mission due to uncertainty about quantity of propellant.

4.1.2.3.B.9 Pressure Sensors (2 issues)

1) FAILURE: INDICATES LOWER PRESSURE THAN NORMAL

NO FMEA FRCS-1144

3/2R PFP, CIL

<u>ISSUE:</u> The vernier thrusters' chamber pressure sensors indicating a lower than actual pressure may deselect the vernier jets. Reselection capability available. This may cause loss of some mission operations (primary pressure sensors failures on 03-2F-121314-2). (see 4.1.1.B.5)

2) FAILURE: INDICATES HIGHER PRESSURE THAN NORMAL

NO FMEA FRCS-1145

3/2R PFP, CIL

ISSUE: The vernier thrusters' chamber pressure sensors indicating a higher than actual pressure may be deselect a jet. Reselection of jet available. This may cause loss of some mission operations (primary pressure sensors failures on 03-2F-121314-1). (see 4.1.1.B.5)

4.1.2.3.B.10 Temperature Sensors (2 issues)

1) FAILURE: INDICATES LOWER TEMPERATURE THAN NORMAL

NO FMEA FRCS-1154

3/2R PFP, CIL

<u>ISSUE:</u> The vernier thrusters' injector temperature sensors indicating a lower than actual temperature may deselect a jet. Reselection of jet available. This may cause loss of some mission operations (primary injector temperature sensors failures on 03-2F-121315-2). (see 4.1.1.B.5)

2) FAILURE: INDICATES HIGHER TEMPERATURE THAN NORMAL

NO FMEA FRCS-1155

3/2R PFP, CIL

ISSUE: The vernier thrusters' injector temperature sensors indicating a higher than actual temperature may deselect a jet. Reselection of jet available. This may cause loss of some mission operations (primary injector temperature sensors failures on 03-2F-121315-1). (see 4.1.1.B.5)

4.1.2.4 Thermal Control Subsystem (3 issues)

4.1.2.4.A Hardware

IOA analyzed and assessed thermal control subsystem items as EPD&C items. See 4.1.2.4.B for assessment results.

4.1.2.4.B EPD&C (3 issues)

4.1.2.4.B.1 Thermal Switches (2 issues)→

1) FAILURE: FAILS CLOSED (HEATERS REMAIN ON)

NO FMEA FRCS-1300

2/2, CIL

<u>ISSUE:</u> Vernier thruster switch not specifically called out on this FMEA. (see 4.1.1.B.5)

2) FAILURE: FAILS OPEN

NO FMEA

FRCS-1301

3/2R PPP

ISSUE: Vernier thruster switch not specifically called out on this FMEA. (see 4.1.1.B.5)

4.1.2.4.B.2 Hybrid Drivers (1 issue)

1) FAILURE: INADVERTENT OUTPUT

05-6KF-2215-2 3/3 FRCS-1157,1159,1161,1163,1165,1167, 3/2R PPP 1169,1171,1173,1175,1177,1179

ISSUE: This driver failed short causes inability to turn off heater with thermostat. Heater can be turned off with switch. Loss of all redundancy may cause loss of some mission operations due to orbiter pointing deep space for cooling.

4.2 Aft RCS Assessment Results

The unresolved aft RCS hardware and EPD&C issues are presented in the following sections. Several general issues are first presented (section 4.2.1), followed by the specific unresolved issues (section 4.2.2).

4.2.1 General Aft RCS Issues

Many of the unresolved issues which exist on individual FMEAs and CILs are linked to several "general" issues identified by IOA during the RCS FMEA/CIL assessment. These general issues concern either the groundrules used by NASA/RI to perform the FMEA/CIL analysis, or the NASA/RI analysis of the RCS subsystem. Each of the general IOA issues results in numerous FMEA and CIL issues.

The general issues identified by IOA in the ARCS hardware and EPD&C assessments are discussed in the following sections.

4.2.1.A Hardware

Four general areas of difference between the IOA and NASA/RI aft RCS subsystem analyses are responsible for many of the unresolved ARCS hardware issues.

4.2.1.A.1 Inability to Complete Abort Propellant Dumps

During RTLS and TAL aborts, OMS propellant is dumped through the twenty-four ARCS primary thrusters, and RCS propellant is dumped through the four +X primary thrusters. Inability to complete full propellant dumps could result in violations of entry mass properties constraints and/or violations of the OMS or RCS propellant tank landing weight constraints due to the additional amount of undumped propellants remaining in the tanks.

Therefore, IOA has classified each single failure which results in the loss of one or more primary thrusters as a crit 1 during aborts. The current NASA criticalities on these types of failures do not include any abort crit 1 assignments.

For a flight on which an OMS abort dump to the propellant tank landing weight constraint (22%) is planned, loss of one ARCS thruster would reduce the amount of OMS propellant dumped and thus result in some OMS propellant remaining in the tank in excess of the tank landing weight limit. For a flight which has an abort entry X cg approaching the aft limit (1109.0 inches), any additional amount of undumped OMS propellant would move the X cg further aft, possibly resulting in violation of the aft limit.

Similarly, loss of one +X thruster reduces the RCS propellant dump rate by half for one pod and could result in an incomplete RCS dump. The additional amount of undumped propellant in the RCS

tanks could result in violation of the RCS tank landing weight limit (70%) and/or violations of entry mass properties constraints.

Violation of a propellant tank landing weight limit could result in vehicle structural damage and or tank structural failure during entry or landing.

Six (6) of the ARCS issues are related to this general issue.

4.2.1.A.2 Propellant Leakage

IOA considers any leakage of RCS propellant (MMH or NTO) to be potentially life and vehicle threatening, regardless of where the leakage occurs. NSTS 22206 states that "A single failure resulting in leakage of LO2, LH2, N2H4, or MMH shall be classified as a Criticality 1" (p. 2-11, item h). Therefore, IOA classifies any single failure which results in prop leakage as a 1/1. If redundant items must fail before leakage occurs, IOA classifies the failure as a functional criticality 1R. Propellant leakage can result in contamination and corrosion of other components, fire, explosion, or exposure of EVA and ground crews to propellant or propellant vapors.

Twelve (12) of the ARCS hardware issues are related to this general issue.

4.2.1.A.3 Isolation Valve Internal Relief Device Failure

The propellant tank isolation valves, crossfeed valves, primary manifold isolation valves, and vernier manifold isolation valves each have an internal pressure relief device which would relieve a downstream overpressurization condition if the valve was closed. With the exception of the aft RCS vernier manifold isolation valve (03-2A-202140-3, 1/1), NASA/RI assigns 3/3 criticalities to the FMEAs which address the failure of this device to relieve IOA contends that it is possible that a downstream pressure. failed closed relief device could allow a downstream pressure build-up sufficient to cause a prop line leak. This is supported by the fact that the prop line structural failure FMEA (03-2A-202108-1) lists this failure as a cause. Since this failure could result in line failure and prop leakage, IOA recommends that the current 3/3 FMEAs for the relief device failures be upgraded accordingly.

Three (3) of the ARCS hardware issues are related to this general issue.

4.2.1.A.4 Additional Items and Failure Modes

A number of RCS subsystem items and failure modes identified by IOA during the analysis phase are not covered in the current NASA FMEA/CIL. IOA recommends that these items and failure modes be incorporated into the FMEA/CIL. These issues are identified in Appendix F by issue codes HDW 4 and HDW 5.

Thirty-four (34) of the ARCS hardware issues are related to this general issue.

4.2.1.B EPD&C

IOA has several general EPD&C issues that tend to inflate the number of issues shown in the assessment tables. The following general issues remain unresolved.

4.2.1.B.1 Loss of Talkback Data

IOA considers that the loss of data to determine the actual position of a valve to be a 3/2R PPP. Valve position data is provided by the GPC/MDM discretes and the event indicators, which provide redundancy for each other. Loss of all redundancy may lead to falsely failing the valve closed which could effect mission operations. NASA FMEAs have a 3/3 criticality for these failures.

This type of failure mode accounts for 25 open issues shown in the assessment tables for the aft EPD&C (6 issues in the helium pressurization subsystem and 19 in the propellant storage and distribution subsystem). They are identified by issue code EPD&C 1 in Appendix F.

4.2.1.B.2 FMEA Downgrades to 3/3 or 3/2R PPP - NSTS 22206 Interpretations

Numerous issues remain open due to different interpretations of NSTS 22206. All these issues concern the definition of the redundancy string. IOA did not consider multiple or unrelated failures in determining the criticality. IOA claims these FMEAs warrant a 3/2R PPP or 3/3 for the failure mode.

This type of failure mode accounts for 54 open issues shown in the assessment tables for the aft RCS EPD&C (1 issue in the helium pressurization subsystem, 46 issues in the propellant storage and distribution subsystem, and 7 issues in the thruster subsystem). They are identified by issue code EPD&C 2 in Appendix F.

4.2.1.B.3 FMEA Failure Scenario Upgrades - NSTS 22206 Interpretations

These issues also remain open due to the different interpretations of NSTS 22206. All these issues concern the definition of the redundancy string. IOA did not consider multiple or unrelated failures in determining criticality, however IOA did consider the functional redundancy for the item in question. Based on this, IOA failure scenarios create a 1R or CIL item condition, without using multiple or unrelated failures. IOA recommends these failure scenarios and criticality upgrades be included in the NASA FMEA/CIL.

These failure modes account for 9 open issues in the propellant storage and distribution subsystem as shown in the aft RCS EPD&C assessment tables. They are identified by issue code EPD&C 3 in Appendix F.

4.2.1.B.4 EPD&C Issues Tied to Open IOA Hardware Issues

These issues are directly related to the open IOA hardware issues. These failure modes account for 8 open issues in the propellant storage and distribution subsystem. They are identified by issue code EPD&C 4 in Appendix F.

4.2.1.B.5 Additional EPD&C Failure Modes Recommended by IOA

These failure modes are not currently addressed by the NASA FMEA/CIL. IOA recommends these failure modes be incorporated into the FMEA/CIL.

These failures account for 32 open issues shown in the assessment tables for the aft RCS EPD&C (3 issues in the helium pressurization subsystem, 16 issues in the propellant storage and distribution subsystem, 5 issues in the thruster subsystem, and 8 issue in the thermal control subsystem). They are identified by issue code EPD&C 5 in Appendix F.

4.2.2 Specific Aft RCS Issues

The specific aft RCS hardware and EPD&C unresolved issues are presented in the following sections and paragraphs which were referenced in tables I and II. The organization of the sections and paragraphs follow the RCS hierarchy shown in Figures 4-7, and used in tables I and II.

Unresolved issues which are related to general issues discussed in section 4.2.1 contain a reference to the applicable general issue. Each issue is presented in a standard format which gives the failure mode, applicable FMEA number and IOA assessment ID, the NASA and IOA criticality and screen assignments, and the rationale behind the IOA issue. Refer to assessment sheets in Appendix C for further information on each issue.

4.2.2.1 Helium Pressurization Subsystem (24 issues)

4.2.2.1.A Hardware (14 issues)

4.2.2.1.A.1 Helium Tank Isolation Valves (4 issues)

1) FAILURE: FAILS OPEN

03-2A-201020-2 3/1R PPP RCS-202 3/1R PFP, CIL

ISSUE: IOA recommends that this failure mode be upgraded to a 3/1R PFP. A failure of the redundant secondary regulator would not be detectable in flight (fail B screen). No way to tell that one level of redundancy has been lost.

2) FAILURE: INTERNAL LEAKAGE

NO FMEA

RCS-202A 3/1R PFP, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers internal leakage to be a credible failure mode and recommends that it be addressed on the FMEA/CIL. Effects same as "fails open". See issue on 03-2A-201020-2, above.

3) FAILURE: RESTRICTED FLOW

NO FMEA

RCS-10020X 2/1R PFF, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode and recommends that a 2/1R PFF FMEA and CIL be added. Effects same as "failed closed". Failure not detectable during dual leg operation (fail B screen). Contamination can affect both valves simultaneously (fail C screen).

4) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA

RCS-10021X 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers external leakage of the He isol valve due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in loss of helium pressurant.

4.2.2.1.A.2 Regulator Assemblies (3 issues)

1) FAILURE: FAILS CLOSED, RESTRICTED FLOW

03-2A-201030-2 2/1R PPF, CIL

RCS-211 2/1R PFF, CIL (Fails closed) RCS-212 2/1R PFF, CIL (Restricted flow)

ISSUE: IOA recommends that the B screen be failed for these failure modes. A failed closed regulator would not be detectable during dual leg operation. IOA accepts NASA/RI failure of C screen, however has not identified a single event which can result in the loss of both parallel regs. Contamination from downstream source (prop vapors) requires multiple failures (quad check valve poppets). The NASA/RI C screen classification is inconsistent between the forward and aft RCS regulator analyses.

2) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA

RCS-213 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers external leakage of the He regulator due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in loss of helium pressurant.

3) FAILURE: SENSING PORT LEAKAGE

NO FMEA

RCS-214 3/2R PFP, CIL

ISSUE: This failure mode is not currently addressed on the NASA RCS FMEA/CIL, but is addressed on the NASA OMS FMEA/CIL (03-3-1004-3, sensing port leakage, 3/2R PFP). IOA recommends that this failure mode also be addressed for the RCS regulators, with the same rationale used in the OMS subsystem.

4.2.2.1.A.3 Quad Check Valve Assemblies (2 issues)

1) FAILURE: FAILS OPEN, INTERNAL LEAKAGE

03-2A-201095-1 3/3 ---

RCS-218 2/1R PFP, CIL

ISSUE: IOA recommends that this failure mode be upgraded to a 2/1R PFP. IOA contends that, with series check valve poppets failed open or leaking, the contamination of upstream components by prop or prop vapors during a mission could result in loss of prop tank repressurization capability and subsequent inability to utilize ARCS prop. Contamination by prop could cause parallel regulators to fail closed.

2) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA

RCS-10024X 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers external leakage of the quad check valve assembly due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in loss of helium pressurant, and leakage of prop and/or prop vapors. See 4.2.1.A.2.

4.2.2.1.A.4 Quick Disconnect Couplings (5 issues)

1,2) FAILURE: EXTERNAL LEAKAGE

03-2A-201070-1 2/1R FFP, CIL RCS-200 2/1R FFP, CIL

03-2A-201091-1 3/1R FFP, CIL RCS-208, 216, 220, 243 3/1R FFP, CIL

ISSUE: IOA recommends that "poppet fails open" be added as a failure mode on the FMEAs listed. This is a credible failure mode and is addressed on other QD coupling FMEAs.

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3-5) FAILURE: FAILS TO COUPLE

03-2A-201070-2, 201091-2, 202150-2 3/3 ---RCS-201, 209, 217, 221, 226, 232, 238, 244 3/3 ---

<u>ISSUE:</u> IOA recommends that "restricted flow" be added as a failure mode on the FMEAs listed. This is a credible failure and is addressed on other QD coupling FMEAs.

4.2.2.1.B EPD&C (10 issues)

4.2.2.1.B.1 Diodes (4 issues)

1) FAILURE: FAILS OPEN

05-6KA-2267-1 3/3

ARCS-1326,1336 3/2R PPP

<u>ISSUE:</u> This issue concerns falsely failing the valve closed. (see 4.2.1.B.1)

2) FAILURE: FAILED SHORT

05-6KA-2252-2 3/1R PFP, CIL

ARCS-1323,1325,1333,1335 3/3

ISSUE: NASA FMEA contains multiple failures (same diode short to ground). IOA-RCS claims this diode failed short alone has no effect. (see 4.2.1.B.2)

3) FAILURE: FAILS OPEN

NO FMEA

ARCS-12329 2/1R PPP, CIL

ISSUE: IOA-RCS claims this diode failed open causes inability to open the valve. Redundancy provided by other valve. Loss of this causes inability to expel propellants to meet landing weight constraints.

4) FAILURE: FAILS SHORT

NO FMEA

ARCS-12330 3/3

ISSUE: IOA-RCS claims this diode failing short has no effect.
No FMEA exists for this failure.

4.2.2.1.B.2 Hybrid Drivers (2 issues)

1) FAILURE: LOSS OF OUTPUT

05-6KA-2201-1

3/3

ARCS-1346,1358

3/2R PPP

2) FAILURE: LOSS OF OUTPUT

05-6KA-2201A-1

3/3

ARCS-1348,1360

3/2R PPP

ISSUE: Both of these issues concern falsely failing the valve closed. (see 4.2.1.B.1)

4.2.2.1.B.3 Resistors (2 issues)

1) FAILURE: FAILS OPEN

05-6KA-2077-1

3/3

ARCS-1372,1374,1378,1380

3/2R PPP

2) FAILURE: FAILS OPEN

05-6KA-2078-1

3/3

ARCS-1376,1377,1392,1393 3/2R PPP

ISSUE: Both of these issues concern falsely failing the valve closed. (see 4.2.1.B.1)

4.2.2.B.1.4 Microswitches (1 issue)

1) FAILURE: ERRONEOUS OUTPUT

NO FMEA

ARCS-12331

3/2R PPP

ISSUE: IOA-RCS claims this failed open resistor causes loss of accourate indication of the valve status from the event indicator or the GPC/MDM microswitch discretes. This may lead to falsely failing the valve closed.

4.2.2.1.B.5 Event Indicators (1 issue)

1) FAILURE: FAILS OPEN

05-6KA-2151-1

3/3

ARCS-1413

3/2R PPP

ISSUE: This issue concerns falsely failing the valve closed.
(see 4.2.1.B.1)

4.2.2.2 Propellant Storage and Distribution Subsystem (135 issues)

4.2.2.2.A Hardware (23 issues)

4.2.2.2.A.1 Propellant Tank Acquisition Assembly (1 issue)

1) FAILURE: STRUCTURAL FAILURE, HELIUM PASSAGE, SCREEN DRY-OUT

ISSUE: IOA recommends that the propellant tank acquisition device components be itemized in the item list or functional description sections to show specifically what is covered by this FMEA (e.g.: upper compartment channels/screens, lower compartment channels/screens, feedout tubes, plenum, bulkhead, etc.).

4.2.2.2.A.2 Pressure Relief Assemblies (3 issues)

1) FAILURE: BURST DISK LEAKAGE

NO FMEA RCS-241 2/1R PFP, CIL

ISSUE: - Internal leakage of the burst disk is a credible failure mode and is-not currently addressed on the NASA FMEA/CIL. IOA recommends that this failure mode be added to 03-2A-201060-5 (pressure relief valve assy, burst disk ruptures prematurely, 2/1R PFP). The failure history of the burst disk includes internal leakage.

2) FAILURE: RESTRICTED FLOW

NO FMEA

RCS-10026X 3/1R FNP, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode for components with integral filters and/or orifices, and recommends that it be addressed for the pressure relief valve. Failure mode can be added to 03-2A-201060-3 (pressure relief valve assy, burst disk fails to rupture, 3/1R FNP).

3) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA

RCS-10027X 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. FMEA 03-2A-201060-1 addresses only a bellows failure. IOA considers external leakage of the relief valve assembly due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in loss of helium pressurant, and leakage of prop or prop vapors. See 4.2.1.A.2.

4.2.2.2.A.3 Ground Manual Isolation Valve (1 issue)

1) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-247 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers external leakage of the ground manual isolation valve due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in loss of helium pressurant, and leakage of prop and/or prop vapors. See 4.2.1.A.2.

4.2.2.2.A.4 Propellant Tank Isolation Valves (5 issues)

1) FAILURE: FAILS CLOSED (1/2 VALVE)

03-2A-202110-1 3/1R PPP

RCS-251 3/1R PPP, 1/1 ABORT, CIL

ISSUE: IOA recommends that this failure mode be upgraded to a 3/1R PPP, 1/1 abort for the 1/2 valve. This failure results in the loss of one +X thruster for the RTLS and TAL abort ARCS propellant dump, and could result in inability to complete the dump. See 4.2.1.A.1.

2) FAILURE: RELIEF DEVICE FAILS CLOSED

03-2A-202110-2 3/3 ---

RCS-10029X 2/1R PNP, CIL (1/2 VALVE) RCS-10030X 3/1R PNP (3/4/5 VALVES)

<u>ISSUE:</u> These valves are nominally open during all phases, and will be closed only during some crossfeed/interconnect operations or to isolate a downstream failure. During crossfeed/interconnect operations, the downstream propellant line is not subject to overpressurization because it is open to a tank. Therefore, this failure mode is applicable only during straight-feed operations when a failure has occurred which requires closing of the tank isol valves. IOA recommends that this failure mode be upgraded to a 2/1R PNP for the 1/2 valve and 3/1R PNP for the 3/4/5 valves (not a 1/1's, since a previous failure is required for the valves to be closed). See 4.2.1.A.3.

3) FAILURE: RESTRICTED FLOW (1/2 VALVE)

NO FMEA

RCS-249 3/1R PPP, 1/1 ABORT, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode for components with integral filters, and recommends that it be addressed for the propellant tank isolation 1/2 valves. Effects same as "failed closed" for the 1/2 valve. See issue on 03-2A-202110-1, above, and 4.2.1.A.1.

4) FAILURE: RESTRICTED FLOW (3/4/5 VALVES)

NO FMEA

RCS-10028X 3/1R PFP, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode for components with integral filters, and recommends that a new 3/1R PFP FMEA be added for restricted flow of the propellant tank isolation 3/4/5 valves. Restricted flow through one 3/4/5 valve would not be detectable during dual leg operation (fail B screen).

5) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-248 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. FMEA 03-2A-202111-1 addressed only a bellows failure. IOA considers external leakage of a prop tank isolation valve due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results leakage of propellant. See 4.2.1.A.2.

4.2.2.2.A.5 Crossfeed Valves (3 issues)

1) FAILURE: RELIEF DEVICE FAILS CLOSED

03-2A-202111-3 3/3 ---RCS-10033X 3/1R PNP

ISSUE: These valves are nominally closed during a flight and are open only during crossfeed/interconnect operations. IOA recommends that the FMEA for this failure mode be upgraded to a 3/1R PNP. Failure of the relief devices in all RCS and OMS crossfeed valves is required for overpressurization and leakage of the crossfeed lines to occur. See 4.2.1.A.3.

2) FAILURE: RESTRICTED FLOW

NO FMEA RCS-258 2/2 ---, 1/1 ABORT, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode for components with integral filters, and recommends that it be addressed for the RCS crossfeed valves. This failure can be added to 03-2A-202111-2 (RCS crossfeed valve, fails closed, 2/2, 1/1 abort).

3) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-259A 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. FMEA 03-2A-202111-1 addressed only a bellows failure. IOA considers external leakage of a crossfeed valve due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results leakage of propellant. See 4.2.1.A.2.

4.2.2.2.A.6 Primary Manifold Isolation Valves (4 issues)

1) FAILURE: RELIEF DEVICE FAILS CLOSED

03-2A-202120-2 3/3 ---RCS-10035X 2/1R PNP, CIL

ISSUE: These valves are nominally open during all phases, and will not be closed unless a downstream failure occurs which requires isolation. Therefore, this failure mode is not applicable until another failure occurs. IOA recommends that the FMEA for this failure mode be upgraded to a 2/1R PNP (not a 1/1, since a previous failure is required for the valve to be closed). See 4.2.1.A.3.

2) FAILURE: FAILS CLOSED, FAILS TO REMAIN OPEN

03-2A-202120-3 3/1R PPP RCS-267, 271, 275, 279 3/1R PPP, 1/1 ABORT, CIL

ISSUE: IOA recommends that this failure mode be upgraded to a 3/1R PPP, 1/1 abort. This failure results in the loss of three primary thrusters and could result in the inability to complete RTLS and TAL abort RCS and OMS propellant dumps. See 4.2.1.A.1. IOA also recommends that the "E" effects be revised. Loss of three manifolds results in probable inability to maintain entry control.

3) FAILURE: RESTRICTED FLOW

NO FMEA
RCS-287 3/1R PPP, 1/1 ABORT, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode for components with integral filters, and recommends that it be addressed for the primary manifold isolation valves. Effects same as "fails closed". See issue on 03-2A-202120-3, above, and 4.2.1.A.1.

4) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-286 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. FMEA 03-2A-202111-1 addressed only a bellows failure. IOA considers external leakage of a primary manifold isolation valve due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results leakage of propellant. See 4.2.1.A.2.

- 4.2.2.2.A.7 Vernier Manifold Isolation Valves (2 issues)
- 1) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA

RCS-286A 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. FMEA 03-2A-202140-3 addressed a bellows failure. IOA considers external leakage of a vernier manifold isolation valve due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results leakage of propellant. See 4.2.1.A.2.

2) FAILURE: RESTRICTED FLOW

NO FMEA RCS-287 2/2 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode for components with integral filters, and recommends that it be addressed for the vernier manifold isolation valves. Effects same as "fails closed". This failure mode can be added to 03-2A-202140-1 (vernier manifold isolation valve, fails closed, 2/2).

4.2.2.2.A.8 Quick Disconnect Couplings (4 issues)

1,2) FAILURE: EXTERNAL LEAKAGE

03-2A-201080-1 2/1R FFP, CIL RCS-254, 256, 268, 272, 276, 280, 284 2/1R FFP, CIL

03-2A-201090-1 3/1R FFP, CIL RCS-229, 233, 235 3/1R FFP, CIL

ISSUE: IOA recommends that "poppet fails open" be added as a failure mode on the FMEAs listed. This is a credible failure mode and is addressed on other QD coupling FMEAs.

3,4) FAILURE: FAILS TO COUPLE

03-2A-201080-3, 201090-2 RCS-230, 234, 236, 255, 257, 269, 273, 277, 281, 285 3/3 ---

ISSUE: IOA recommends that "restricted flow" be added as a failure mode on the FMEAs listed. This is a credible failure and is addressed on other QD coupling FMEAs.

4.2.2.2.B EPD&C (112 issues)

4.2.2.2.B.1 Remote Power Controllers (3 issues)

1) FAILURE: INADVERTENT OPERATION

05-6KA-2177-2 3/1R PFP, CIL

ARCS-12019 3/3

ISSUE: NASA FMEA contains multiple failures (open driver failed on, ground driver failed on, causing continuous power to the solenoid). IOA-RCS claims this RPC imadvertently operating alone has no effect. (see 4.2.1.B.2)

2) FAILURE: INADVERTENT OPERATION

05-6KA-2178-2 3/1R PFP, CIL

ARCS-12019 3/3

ISSUE: NASA FMEA contains multiple failures (open driver failed on, ground driver failed on, causing continuous power to the solenoid). IOA-RCS claims this RPC inadvertently operating alone has no effect.

3) FAILURE: LOSS OF OUTPUT

05-6KA-2178<u>-</u>1 3/2R PPP ARCS-12020 2/2, CIL

<u>ISSUE:</u> Lose capability to open manifold isolation valve. Inability to open valve causes loss of verniers thus mission operations.

4.2.2.2.B.2 Diodes (35 issues)

1) FAILURE: FAILS OPEN

05-6KA-2268-1 3/3

ARCS-12123 3/2R PPP

2) FAILURE: FAILS OPEN

05-6KA-2269-1 3/3

ARCS-1448,1452,1456,1460 3/2R PPP

3) FAILURE: FAILS OPEN

05-6KA-2279-1

3/3

ARCS-12054,12056

3/2R PPP

ISSUE: The first three issues concern falsely failing the valve closed. (see 4.2.1.B.1)

4) FAILURE: FAILS OPEN

05-6KA-2253-1

2/1R PFP, CIL

ARCS-12086,12088

3/3

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed open alone (causing continuous power to the motor) has no effect. (see 4.2.1.B.2)

5) FAILURE: FAILS OPEN

05-6KA-2253E-1

3/1R PFP, CIL

ARCS-12098

3/3

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed open alone (causing continuous power to the motor) has no effect. (see 4.2.1.B.2)

6) FAILURE: FAILS OPEN

05-6KA-2253F-1

3/1R PFP, CIL

ARCS-12100

3/3

ISSUE: NASA FMEA contains multiple failures (shorted diode, continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed open alone has no effect. (see 4.2.1.B.2)

7) FAILURE: FAILS SHORT

05-6KA-2253F-2

3/1R PFP, CIL

ARCS-12101

3/3

ISSUE: NASA FMEA contains multiple failures (close relay failed on, continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed short alone causes no effect. (see 4.2.1.B.2)

8) FAILURE: FAILS OPEN

05-6KA-2254-1 2/1R PFP, CIL

ARCS-12107,12109 3/3

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed open alone (causing continuous power to the motor) has no effect. (see 4.2.1.B.2)

9) FAILURE: FAILS OPEN

05-6KA-2254E-1 3/1R PFP, CIL

ARCS-12119 3/3

ISSUE: NASA FMEA contains multiple failures (diode short, continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed open alone has no effect. (see 4.2.1.B.2)

10) FAILURE: FAILS OPEN

05-6KA-2254F-1 3/1R PFP, CIL

ARCS-12121

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ISSUE: NASA FMEA contains multiple failures (diode open, continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed open alone has no effect. (see 4.2.1.B.2)

11) FAILURE: FAILS OPEN

05-6KA-2261-1 2/1R PFP, CIL ARCS-12130,12132,12151,12153 3/3

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed open alone (causing continuous power to the motor) has no effect. (see 4.2.1.B.2)

12) FAILURE: FAILS OPEN

05-6KA-2261E-1 3/1R PFP, CIL

ARCS-12142,12163 3/3

ISSUE: NASA FMEA contains multiple failures (diode short, close relay fails on, continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed open alone has no effect. (see 4.2.1.B.2)

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13) FAILURE: FAILS OPEN

05-6KA-2261F-1 3/1R PFP, CIL

ARCS-12144,12165 3/3

ISSUE: NASA FMEA contains multiple failures (diode short, continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed open alone has no effect. (see 4.2.1.B.2)

14) FAILURE: FAILS SHORT

05-6KA-2261F-2 3/1R PFP, CIL

ARCS-12145,12166 3/3

ISSUE: NASA FMEA contains multiple failures (diode opens, close relay fails on, continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed short alone has no effect. (see 4.2.1.B.2)

15) FAILURE: FAILS OPEN

05-6KA-2255-1 2/1R PFP, CIL

ARCS-12192,12194,12208,12210 3/3

12224,12226,12240,12242

ISSUE: - NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed open alone (causing continuous motor power) has no effect. (see 4.2.1.B.2)

16) FAILURE: FAILS OPEN

05-6KA-2255E-1 3/1R PFP, CIL

ARCS-12204,12220,12236,12252 3/3

ISSUE: NASA FMEA contains multiple failures (system leak, diode short, continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed open alone has no effect. (see 4.2.1.B.2)

17) FAILURE: FAILS OPEN

05-6KA-2255F-1 3/1R PFP, CIL

ARCS-12206, 12222, 12238, 12254 3/3

<u>ISSUE:</u> NASA FMEA contains multiple failures (diode short, continuous power to the motor and a bellows leak). IOA-RCS claims this diode failed open alone has no effect. (see 4.2.1.B.2)

18) FAILURE: FAILS OPEN

05-6KA-2257-1 3/1R PFP, CIL

ARCS-12036 3/3

ISSUE: NASA FMEA contains multiple failures (switch short, open driver failed on, causing continuous power to the solenoid). IOA-RCS claims this diode failed open alone has no effect. (see 4.2.1.B.2)

19) FAILURE: FAILS OPEN

05-6KA-2257A-1 3/1R PFP, CIL

ARCS-12038 3/3

ISSUE: NASA FMEA contains multiple failures (switch short, close driver failed on, causing continuous power to the solenoid). IOA-RCS claims this diode failed open alone has no effect. (see 4.2.1.B.2)

20) FAILURE: FAILS SHORT

05-6KA-2257F-2 3/2R PPP

ARCS-12063 3/3

ISSUE: NASA FMEA contains multiple failures (switch short, circuit breaker failed closed, causing continuous power to the solenoid). #IOA-RCS claims this diode failed short alone has no effect. (see 4.2.1.B.2)

21) FAILURE: FAILS SHORT

05-6KA-2253E-2 2/1R PFP (1/1 ABORT), CIL ARCS-12099 2/2 (1/1 ABORT), CIL

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure causes inability to close the valve (open relay has constant inhibit). This prevents crossfeed capability thus loss of mission operations (2/2). Inability to crossfeed may cause incomplete OMS abort dump (1/1 abort). (see 4.2.1.B.3)

22) FAILURE: FAILS SHORT

05-6KA-2254E-2 3/1R PFP (1/1 ABORT), CIL ARCS-12120 2/2 (1/1 ABORT), CIL

ISSUE: NASA FMEA contains multiple failures (diode opens, continuous power to the motor and a bellows leak). IOA-RCS claims this failure causes inability to close the valve (open relay has constant inhibit). This prevents crossfeed capability thus loss of mission operations (2/2). Inability to crossfeed may cause incomplete OMS abort dump (1/1 abort). (see 4.2.1.8.3)

23) FAILURE: FAILS SHORT

05-6KA-2254F-2 3/1R PFP, CIL ARCS-12122 3/1R PFP, CIL

ISSUE: NASA FMEA contains multiple failures (diode opens, continuous power to the motor and a bellows leak). IOA-RCS claims this failure causes the valve to close on ascent (GPC mode). Redundancy provided by second leg and from crossfeed operation. Loss of all redundancy causes inability to expel propellants to meet landing weight constraints. (see 4.2.1.B.3)

24) FAILURE: FAILS SHORT

05-6KA-2261E-2 3/1R PFP, CIL ARCS-12143,12164 3/1R PFP, CIL

ISSUE: NASA FMEA contains multiple failures (open diode, continuous power to the motor and a bellows leak). IOA-RCS claims this failure causes the inability to close the valve. This, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.2.1.B.3)

25) FAILURE: FAILS SHORT

05-6KA-2255E-2 3/1R PFP, CIL ARCS-12205,12221,12237,12253 3/1R PFP, CIL

ISSUE: NASA FMEA contains multiple failures (diode opens, continuous power to the motor and a bellows leak). IOA-RCS claims this failure causes inability to close the valve (open relay has constant inhibit). This, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.2.1.B.3)

26) FAILURE: FAILS SHORT

05-6KA-2255F-2 3/1R PFP, CIL ARCS-12207,12223,12239,12255 3/1R PFP, CIL

ISSUE: NASA FMEA contains multiple failures (system leak, diode opens, continuous power to the motor and a bellows leak). IOA-RCS claims this failure has no effect if command was from switch (normal mission configuration). However, if the command was from the GPC, this failure causes the inability to open the valve (close relay has constant inhibit). Switch redundancy provided. Loss of this, coupled with the loss of all hardware redundancy causes inability to expel propellants to meet landing weight constraints. (see 4.2.1.B.3)

27) FAILURE: FAILS SHORT

05-6KA-2257-2 3/3

ARCS-12037 3/2R PFP, CIL

ISSUE: IOA-RCS claims this failure causes inability to open the isolation valve manually. Redundancy to open the valve provided with the GPC/MDM commands. Loss of all redundancy prevents vernier operation thus loss of mission.

28) FAILURE: INADVERTENT OUTPUT

05-6KA-2255=2 3/3

ARCS-12193,12195,12209,12211 3/2R PPP

12225,12227,12241,12243

ISSUE: This issue concerns falsely failing the valve closed.
(see 4.2.1.B.1)

29) FAILURE: FAILS OPEN

05-6KA-2257G-1 3/3

ARCS-12064 3/1R P NA P

<u>ISSUE:</u> Lose GPC close command to the ground driver. Redundancy provided with manual command. Loss of all redundancy prevents isolation of thruster leak.

30) FAILURE: FAILS OPEN

05-6KA-2258-1 3/2R PPP ARCS-12052 2/2, CIL

<u>ISSUE:</u> Lose GPC and manual command to open the isolation valve. No redundancy provided. This prevents vernier operation thus loss of mission.

31) FAILURE: SHORTS TO GROUND

05-6KA-2258-3 ARCS-12344 3/2R PPP 2/2, CIL

<u>ISSUE:</u> Lose GPC and manual command to open the isolation valve. No redundancy provided. This prevents vernier operation thus loss of mission.

32-33) FAILURE: FAILS OPEN

NO FMEA

ARCS-12068,12070

3/1R P NA P

ISSUE: The manifold isolation valve has two diodes in parallel that completes the circuit to ground. One diode failing open has no effect. Second diode failing open (the redundancy) causes inability to close the valve to isolate a thruster leak.

34-35) FAILURE: FAILS SHORT

NO FMEA

ARCS-12069,12071

3/3

ISSUE: The manifold isolation valve has two diodes in parallel that completes the circuit to ground. Either or both diode failing short has no effect.

4.2.2.2.B.3 Hybrid Drivers (21 issues)

1) FAILURE: LOSS OF OUTPUT

05-6KA-2206-1

3/3

ARCS-1472,1474

3/2R PPP

2) FAILURE: INADVERTENT OUTPUT

05-6KA-2206-2

3/3

ARCS-1473,1475

3/2R PPP

3) FAILURE: LOSS OF OUTPUT

05-6KA-2207A-1

3/3

ARCS-1476,1477,1482,1483

3/2R PPP

4) FAILURE: LOSS OF OUTPUT

05-6KA-2217-1 3/3

ARCS-1488,1490,1492,1494 3/2R PPP

5) FAILURE: INADVERTENT OUTPUT

05-6KA-2217-2 3/3

ARCS-1489,1491,1493,1495 3/2R PPP

ISSUE: The first five issues concern falsely failing the valve closed. (see 4.2.1.B.1)

6) FAILURE: LOSS OF OUTPUT

05-6KA-2207-1 2/1R PFP, CIL

ARCS-1478,1484 3/2R PPP

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.B.2)

7) FAILURE: INADVERTENT OUTPUT

05-6KA-2207-2 3/1R PPP

ARCS-1479,1485 3/3

ISSUE: NASA FMEA contains multiple failures (driver failed on, manifold isolation valve failed open, thruster leak). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.2.1.B.2)

8) FAILURE: LOSS OF OUTPUT

05-6KA-2219-1 2/1R PFP, CIL

ARCS-1480,1486 3/2R PPP

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.B.2)

9) FAILURE: INADVERTENT OUTPUT

05-6KA-2219-2

3/1R PFP, CIL

ARCS-1481,1487

3/3

<u>ISSUE:</u> NASA FMEA contains multiple failures (driver failed on, manifold isolation valve failed open, thruster leak). IOA-RCS claims this driver inadvertently operating alone has no effect.

10) FAILURE: LOSS OF OUTPUT

05-6KA-2208-1

2/1R PFP, CIL

ARCS-1496,1498,1500,1502

3/2R PPP

1504,1506,1508,1510

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.B.2)

11) FAILURE: INADVERTENT OPERATION

05-6KA-2113A-2

3/1R PFP, CIL

ARCS-12033

3/3

ISSUE: NASA FMEA contains multiple failures (open driver failed on, ground driver failed on, causing continuous power to the solenoid). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.2.1.B.2)

12) FAILURE: LOSS OF OUTPUT

05-6KA-2210-1

3/1R PFP, CIL

ARCS-12024

3/2R PPP

ISSUE: NASA FMEA contains multiple failures (switch short, ground driver failed on, causing continuous power to the solenoid). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.B.2)

13) FAILURE: LOSS OF OUTPUT

05-6KA-2210A-1 3/1R PFP, CIL ARCS-12022 3/2R PPP

ISSUE: NASA FMEA contains multiple failures (switch short, ground driver failed on, causing continuous power to the solenoid). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.B.2)

14) FAILURE: INADVERTENT OPERATION

05-6KA-2211-2 3/1R PFP, CIL ARCS-12031 3/3

ISSUE: NASA FMEA contains multiple failures (open driver failed on, ground driver failed on, causing continuous power to the solenoid). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.2.1.B.2)

15) FAILURE: INADVERTENT OPERATION

05-6KA-2212-2 3/1R PFP, CIL ARCS-12029 3/3

ISSUE: NASA FMEA contains multiple failures (open driver failed on, ground driver failed on, causing continuous power to the solenoid). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.2.1.B.2)

16) FAILURE: INADVERTENT OPERATION

05-6KA-2213-2 3/1R PFP, CIL ARCS-12027 3/3

ISSUE: NASA FMEA contains multiple failures (close driver failed on, ground driver failed on, causing continuous power to the solenoid). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.2.1.B.2)

17) FAILURE: INADVERTENT OPERATION

05-6KA-2224-2 3/1R PFP, CIL ARCS-12035 3/3

ISSUE: NASA FMEA contains multiple failures (type I driver failed on, type III driver failed on, causing continuous power to the solenoid). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.2.1.B.2)

18) FAILURE: LOSS OF OUTPUT

05-6KA-2113A-1 3/2R PPP ARCS-12032 2/2, CIL

<u>ISSUE:</u> Lose capability to open the isolation valve. This prevents vernier operation thus loss of mission.

19) FAILURE: INADVERTENT OPERATION

05-6KA-2210-2 3/2R PPP ARCS-12025 2/2, CIL →

ISSUE: Failure provides inhibit to the "open" driver so that it cannot be turned on. This causes inability to open the isolation valve which causes loss of verniers thus mission operations.

20) FAILURE: INADVERTENT OPERATION

05-6KA-2211-1 3/2R PPP ARCS-12031 2/2, CIL

<u>ISSUE:</u> Lose capability to open the isolation valve. Inability to open the valve causes loss of verniers thus mission operations.

21) FAILURE: LOSS OF OUTPUT

05-6KA-2224-1 3/1R PPP ARCS-12034 2/2, CIL

ISSUE: Lose capability to open the isolation valve. This prevents vernier operation thus loss of mission. NASA FMEA failure also credible. Lose capability to close valve to isolate a thruster leak. IOA-RCS recommends both failures be covered on this FMEA.

4.2.2.2.B.4 Relays (11 issues)

1) FAILURE: INADVERTENT OPERATION

05-6KA-2126-2 3/1R PFP, CIL

ARCS-1546,1548 3/3

ISSUE: NASA FMEA contains multiple failures (second series relay failed closed, continuous power to the motor and a bellows leak). IOA-RCS claims this relay inadvertently operating alone causes no effect. (see 4.2.1.B.2)

2) FAILURE: INADVERTENT OPERATION

05-6KA-2132-2 3/1R PFP, CIL ARCS-1562,1564,1570,1572 3/3

ISSUE: NASA FMEA contains multiple failures (close relay fails on, continuous power to the motor and a bellows leak). IOA-RCS claims the latching relay inadvertently operating alone has no effect. (see 4.2.1.B.2)

3) FAILURE: LOSS OF OUTPUT

05-6KA-2133-1 3/1R PPP ARCS-1557,1559,1565,1567 3/2R PPP

ISSUE: NASA FMEA contains multiple failures (open relay fails off, tank isolation valve failed closed, thruster failed off). IOA-RCS claims this failure causes inability to open the crossfeed valve. Electrical redundancy provided. Loss of this, coupled with the loss of all hardware redundancy may causes loss of mission. Note: FMEA incorrectly identifies relay 45V76A116K44. It should be 56V76A116K46. Refer to VS70-943099 and ARCS ID 1557. (see 4.2.1.B.2)

4) FAILURE: INADVERTENT OPERATION

05-6KA-2136-2 2/1R PFP (1/1 ABORT), CIL ARCS-1542,1544 2/2 (1/1 ABORT), CIL

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure causes inability to close 1/2 valve. This prevents crossfeed capability thus loss of mission operations (2/2). Inability to crossfeed may cause incomplete OMS abort dump (1/1 abort). (see 4.2.1.B.3)

5) FAILURE: INADVERTENT OPERATION

05-6KA-2127-2 2/1R PFP, CIL ARCS-1552,1556 3/1R PFP, CIL

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure will close the valve and cause inability to re-open it. Redundancy provided by second 3/4/5 leg and from crossfeed operation. Loss of all redundancy causes loss of jets required to expel propellants to meet landing weight constraints. (see 4.2.1.B.3)

6) FAILURE: INADVERTENT OPERATION

05-6KA-2137-2 2/1R PFP (1/1 ABORT), CIL ARCS-1550,1554 2/2 (1/1 ABORT), CIL

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure causes inability to close 3/4/5 valve. This prevents crossfeed capability thus loss of mission operations (2/2). Inability to crossfeed may cause incomplete OMS abort dump (1/1 abort). (see 4.2.1.8.3)

7) FAILURE: INADVERTENT OPERATION

05-6KA-2133-2 2/1R PFP, CIL ARCS-1558,1560,1566,1568 3/1R PFP, CIL

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure causes inability to close crossfeed valve. This, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.2.1.B.3)

8) FAILURE: INADVERTENT OPERATION

05-6KA-2128-2 2/1R PPP, CIL ARCS-1576,1580,1584,1586 3/1R PPP (1/1 ABORT), CIL

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure will close the valve and cause the inability to re-open it. This causes loss of jets on associated manifold. Redundancy provided by jets on other manifolds. Loss of all redundancy causes inability to expel propellants to meet landing weight constraints. Loss of manifold thrusters during RTLS/TAL abort could result in inability to complete a propellant dump. (see 4.2.1.B.3)

9) FAILURE: INADVERTENT OPERATION

05-6KA-2128A-2 2/1R PPP, CIL ARCS-1574,1578,1582,1588 3/1R PNP

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure causes inability to close manifold isolation valve. This, coupled with the loss of all hardware redundancy causes inability to isolate a thruster leak. (see 4.2.1.B.3)

10) FAILURE: LOSS OF OUTPUT

05-6KA-2126-1 3/1R PPP (1/1 ABORT), CIL ARCS-1545,1547 2/2 (1/1 ABORT), CIL

ISSUE: Lose capability to close the valve. This prevents crossfeed capability thus loss of mission (2/2). Inability to crossfeed may cause incomplete OMS abort dump (1/1 abort).

11) FAILURE: LOSS OF OUTPUT

05-6KA-2127-1 2/2, CIL 4 ARCS-1551,1555 2/1R PPP, CIL

<u>ISSUE:</u> Lose capability to close the valve. This prevents crossfeed capability and inability to isolate a leak.

4.2.2.2.B.5 Resistors (19 issues)

1) FAILURE: FAILS OPEN

05-6KA-2081-1 3/3 (1/1 ABORT), CIL ARCS-1589,1591,1603,1605 3/2R PPP

2) FAILURE: FAILS OPEN

05-6KA-2082=1 3/3 ARCS-1597,1601 3/2R PPP

3) FAILURE: FAILS OPEN

05-6KA-2085-1 3/3

ARCS-1613,1615,1617,1629 3/2R PPP

4) FAILURE: FAILS OPEN

05-6KA-2086-1 3/3 (1/1 ABORT), CIL ARCS-1607,1611,1619,1623, 1627,1631,1633,1635

5) FAILURE: FAILS OPEN

05-6KA-2102-1 3/3 ARCS-1641,1647,1651,1655, 3/2R PPP 1659,1665,1669,1673

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6) FAILURE: FAILS OPEN

05-6KA-2088-1 ARCS-1679,1681,1685,1687,1693,1695,1699,1701, 1707,1709,1713,1715,1721,1723,1727,1729

7) FAILURE: FAILS OPEN

05-6KA-2091-1 3/3 ARCS-12012,12013,12014,12015 3/2R PPP

ISSUE: The first seven issues concern falsely failing the valve closed. (see 4.2.1.B.1)

8) FAILURE: FAILS OPEN

05-6KA-2083-1 2/1R PFP (1/1 ABORT), CIL ARCS-1593,1595,1599 3/2R PPP

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.B.2)

9) FAILURE: FAILS OPEN

05-6KA-2084-1 2/1R PFP (1/1 ABORT) ARCS-1609,1621,1625,1637 3/2R PPP

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.B.2)

10) FAILURE: FAILS OPEN

05-6KA-2103-1 2/1R ARCS-1643,1645,1649, 3/2R PPP 1661,1663,1669

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.B.2)

11) FAILURE: FAILS OPEN

05-6KA-2089-1 2/1R PPP ARCS-1683,1697,1711,1725 3/2R PPP

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.B.2)

12) FAILURE: FAILS OPEN

05-6KA-2090-1 3/1R PFP ARCS-12008 3/2R PPP

ISSUE: NASA FMEA contains multiple failures (switch short, ground driver failed on, causing continuous power to the solenoid). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.B.2)

13-19) FAILURE: FAILS SHORT

NO FMEA

ARCS-1644,1646,1650 3/3 1662,1664,1668

<u>ISSUE:</u> A short across these resistors is a credible failure. IOA-RCS recommends they be incorporated into a FMEA.

4.2.2.2.B.6 Toggle Switches (4 issues)

1) FAILURE: INADVERTENT OPERATION

05-6KA-2039-2 3/1R PPP ARCS-12126,12127,12147,12148 2/2 (1/1 ABORT), CIL

ISSUE: NASA FMEA contains multiple failures (close relay failed on, continuous power to the motor and a bellows leak). IOA-RCS claims the switch failed short across close contacts will close the valve and cause inability to re-open it. This prevents crossfeed capability thus loss of mission (2/2). Inability to crossfeed may cause incomplete OMS abort dump (1/1 abort). (see 4.2.1.B.4)

2) FAILURE: INADVERTENT OPERATION

05-6KA-2032-2 3/1R PFP, CIL

ARCS-12204,12205,12206 3/1R PPP

ISSUE: NASA FMEA contains multiple failures (diode failed open, open driver failed on causing continuous power to the solenoid). IOA-RCS claims this failure causes the inability to close the valve. This, coupled with the loss of all hardware redundancy prevents isolation of a thruster leak. (see 4.2.1.B.3)

3) FAILURE: INADVERTENT OPERATION

05-6KA-2028-2 3/1R PPP (1/1 ABORT), CIL ARCS-12082,12083,12084 2/2 (1/1 ABORT), CIL

ISSUE: Switch failed short across open contacts causes inability to close the valve. This prevents crossfeed capability thus loss of mission operation (2/2). Inability to crossfeed may cause incomplete OMS abort dump (1/1 abort). (see 4.2.1.B.4)

4) FAILURE: INADVERTENT OPERATION

05-6KA-2029-2 3/1R PPP (1/1 ABORT), CIL ARCS-12103,12104,12105 2/2 (1/1 ABORT), CIL

<u>ISSUE:</u> - Switch failed short across open contacts causes inability to close the valve. This prevents crossfeed capability thus loss of mission operation (2/2). Inability to crossfeed may cause incomplete OMS abort dump (1/1 abort). (see 4.2.1.B.4)

4.2.2.2.B.7 Microswitches (9 issues)

1) FAILURE: ERRONEOUS OUTPUT

NO FMEA

ARCS-12332 2/2 (1/1 ABORT), CIL

ISSUE: The tank isolation valve 1/2 solenoid talkback switch provides power to the talkback circuitry and the relay inhibit. A microswitch failure across the close contacts will not allow the valve to be closed This prevents crossfeed capability thus loss of mission operations (2/2). Inability to crossfeed may cause incomplete OMS abort dump (1/1 abort). (see 4.2.1.B.5)

2) FAILURE: ERRONEOUS OUTPUT

NO FMEA ARCS-12333

3/1R PPP

The tank isolation valve 3/4/5 solenoid talkback switch provides power to the talkback circuitry and the relay inhibit. A microswitch failure across the open contacts prevents valve from being opened. Hardware redundancy provided by second leg of 3/4/5, the 1/2 valve, and crossfeed operation. Loss of all redundancy causes loss of jets required to expel propellants to meet landing weight constraints. (see 4.2.1.B.5)

3) FAILURE: ERRONEOUS OUTPUT

NO FMEA ARCS-12334

3/1R PFP

The crossfeed isolation valve 1/2 solenoid talkback switch provides power to the talkback circuitry and the relay inhibit. A microswitch failure across the close contacts prevents valve from being closed. This prevents isolation of a thruster leak. (see 4.2.1.B.5)

4-7) FAILURE: ERRONEOUS OUTPUT

NO FMEA ARCS-12336,12337,12338,12339 3/2R PPP

ISSUE: IOA-RCS claims this failed open resistor causes loss of accourate indication of the valve status from the event indicator or the GPC/MDM microswitch discretes. This may lead to falsely failing the valve closed. (see 4.2.1.B.5)

8-9) FAILURE: ERRONEOUS OUTPUT

NO FMEA

ARCS-12074,12075

3/2R PPP

ISSUE: IOA-RCS claims this failed open resistor causes loss of accourate indication of the valve status from the event indicator or the GPC/MDM microswitch discretes. This may lead to falsely failing the valve closed. (see 4.2.1.B.5)

4.2.2.2.B.8 Circuit Breaker (2 issues)

1) FAILURE: SHORT, FAILED CLOSED

05-6KA-2280-2 3/1R PFP, CIL

ARCS-12073 3/3

ISSUE: NASA FMEA contains multiple failures (switch jam, open driver failed on, causing continuous power to the solenoid. IOA-RCS claims this circuit breaker failed closed alone has no effect. (see 4.2.1.B.2)

2) FAILURE: FAILED OPEN

05-6KA-2280-1 3/1R PPP ARCS-12072 2/2, CIL

ISSUE: Lose capability to open the isolation valve. This prevents vernier operation thus loss of mission. NASA FMEA failure also credible. Lose capability to close valve to isolate a thruster leak. IOA-RCS recommends both failures be covered on this FMEA. (see 4.2.1.B.3)

4.2.2.2.B.9 Event Indicators (8 issues)

1) FAILURE: FAILS OPEN

05-6KA-2153-1 3/3

ARCS-1857 3/2R PPP

2) FAILURE: FAILS OPEN

05-6KA-2154-2 3/3

ARCS-1858A 3/2R PPP

3) FAILURE: FAILS OPEN

05-6KA-2159-1 3/3

ARCS-1856 3/2R PPP

4) FAILURE: FAILS OPEN

05-6KA-2155-2 3/3

ARCS-1859A 3/2R PPP

F - 1

5) FAILURE: FAILS OPEN

05-6KA-2156-2 3/3

ARCS-12017 3/2R PPP

ISSUE: The first five issues concern falsely failing the valve closed. (see 4.2.1.B.1)

6) FAILURE: FAILS SHORT TO GROUND

05-6KA-2154-1 2/1R PFP, CIL ARCS-1858 3/2R PPP →

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.B.2)

7) FAILURE: FAILS SHORT TO GROUND

05-6KA-2155-1 2/1R PFP, CIL ARCS-1859 3/2R PPP

ISSUE: NASA FMEA contains multiple failures (continuous power to the motor and a bellows leak - NOTE: FMEA scenario for failure not valid). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.8.2)

8) FAILURE: FAILS SHORT TO GROUND

05-6KA-2156-1 3/1R PFP, CIL ARCS-12016 3/2R PPP

ISSUE: NASA FMEA contains multiple failures (switch short, ground driver fails on, causing continuous power to the solenoid). IOA-RCS claims this failure may cause inability to accurately determine position of the valve. Loss of all redundancy may lead to falsely failing the valve closed. (see 4.2.1.B.2)

- 4.2.2.3 Thruster Subsystem (23 issues)
- 4.2.2.3.A Hardware (10 issues)
- 4.2.2.3.A.1 Primary Thruster Bipropellant Solenoid Valves (6 issues)
- 1) FAILURE: FAILS OPEN, INTERNAL LEAKAGE

03-2A-221310-1 3/1R FPP, CIL

RCS-290 1/1 ---, CIL (Fails open)

RCS-294, 296, 298 1/1 ---, CIL (Internal leakage)

ISSUE: A thruster biprop valve failed open or leaking due to piece-part structural failure or seal failure results in leakage of propellant. See 4.2.1.A.2. Such a failure could also result in jet zots upon subsequent use of the thruster.

2) FAILURE: PREMATURE OPERATION
(DURING GROUND C/O TRICKLE CURRENT TEST)

03-2A-221310-3 3/3 ---RCS-10138X 1/1 ---, CIL

ISSUE: IOA considers a premature (unexpected) firing of an RCS thruster during ground operations and testing to be a 1/1 failure. Such a failure could result in loss of life due to exposure to prop vapors and thruster plume. This failure is the result of a reaction jet driver (RJD) failure. A "failed-on" thruster caused by an RJD failure is covered in the GNC subsystem.

3) FAILURE: FAILS CLOSED (ONE OR BOTH VALVES)

03-2A-221310-4 3/1R FPP, CIL RCS-293, 295, 297 3/1R FPP, 1/1 ABORT, CIL

ISSUE: IOA recommends that this failure mode be upgraded to a 3/1R FPP, 1/1 abort. This failure results in the loss of one primary thruster and could result in the inability to complete RTLS and TAL abort RCS and OMS propellant dumps. See 4.2.1.A.1.

4) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-291 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers external leakage of the primary thruster biprop solenoid valves assembly due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in leakage of propellant. See 4.2.1.A.2.

5) FAILURE: RESTRICTED FLOW

NO FMEA RCS-292 3/1R FPP, 1/1 ABORT, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers restricted flow to be a credible failure mode for components with integral filters, and recommends that it be addressed for the primary thruster biprop valves. Effects same as "fails closed". See issue on 03-2A-221310-4, above, and 4.2.1.A.1.

6) FAILURE: DELAYED OPERATION, ONE VALVE OPENS SLOWLY OR LATE

NO FMEA RCS-10043X - 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers the delayed opening of one biprop valve relative to the other to be a credible failure which should be addressed. Such a failure of the oxidizer valve could result in fuel migration into the oxidizer injector tube and detonation within the tube upon oxidizer flow (zots). Rupture of the valve assembly due to jet zots would result in leakage of propellant. See 4.2.1.A.2. IOA recommends that a 1/1 FMEA be generated for this failure mode.

4.2.2.3.A.2 Primary Thruster Injector Head Assembly (2 issues)

1) FAILURE: RESTRICTED FLOW

NO FMEA

RCS-10040X 1/1 ---, CIL

ISSUE: This item is not currently addressed on the NASA FMEA/CIL. IOA considers the injector assembly to be at the same level of detail as other primary thruster components on the FMEA/CIL, and recommends that a separate 1/1 FMEA be regenerated for this item and failure mode. This will ensure that this critical failure gets the proper amount of attention. Restricted flow leading to an improper mixture ratio or inadequate cooling would probably result in loss of the thruster, and could result in combustion chamber or nozzle extension burn-through.

2) FAILURE: STRUCTURAL FAILURE, BURN-THROUGH

NO FMEA

RCS-10041X 1/1 ---

ISSUE: This item is not currently addressed on the NASA FMEA/CIL. IOA considers the injector assembly to be at the same level of detail as other primary thruster components on the FMEA/CIL, and recommends that a separate 1/1 FMEA be regenerated for this item and failure mode. This will ensure that this critical failure gets the proper amount of attention. Such a failure of the injector head assembly could result in a fire/explosion potential leading to possible damage to the vehicle.

4.2.2.3.A.3 Vernier Thruster Assembly (2 issues)

1) FAILURE: FAILS OPEN, INTERNAL LEAKAGE

03-2A-231310-3 3/1R FPP, CIL

RCS-301 1/1 ---, CIL (Fails open)

RCS-304 1/1 ---, CIL (Internal leakage)

ISSUE: A thruster biprop valve failed open or leaking due to piece-part structural failure or seal failure results in leakage of propellant. See 4.2.1.A.2. The NASA criticalities assigned to these vernier thruster failures are inconsistent between the forward and aft RCS subsystems.

2) FAILURE: STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE

NO FMEA RCS-303 1/1 ---, CIL

ISSUE: This failure mode is not currently addressed on the NASA FMEA/CIL. IOA considers external leakage of the vernier thruster biprop valve assembly due to a housing failure to be a credible failure (ref. NSTS 22206, p. 2-14, item 2.3.7.a), and recommends that it be addressed on the FMEA/CIL. Failure results in leakage of propellant. See 4.2.1.A.2.

4.2.2.3.B EPD&C (13 issues)

4.2.2.3.B.1 Remote Power Controllers (2 issues)

1) FAILURE: INADVERTENT OPERATION

05-6KA-2179-2 3/1R PFP, CIL ARCS-1872,1874,1880,1884, 3/3 1889,1891,1896,1900

ISSUE: NASA FMEA contains multiple failures (RJD command, relay failed closed, manifold isolation valve failed, tank isolation valve failed, main bus failed, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this RPC inadvertently operating alone has no effect. (see 4.2.1.B.2)

2) FAILURE: INADVERTENT OUTPUT

05-6KA-2184-2 3/1R PFP, CIL ARCS-1904,1906 3/3

ISSUE: NASA FMEA contains multiple failures (RPC failed on, RJD command, manifold isolation valve failed, tank isolation valve failed, main bus failed off, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this RPC inadvertently operating alone has no effect.

4.2.2.3.B.2 Hybrid Drivers (3 issues)

1) FAILURE: INADVERTENT OPERATION

05-6KA-2214-2

3/1R PFP, CIL

ARCS-1980,1982,1984,1986

3/3

1988, 1990, 1992, 1994

ISSUE: NASA FMEA contains multiple failures (RJD command, relay failed, manifold isolation valve failed, tank isolation valve failed, main bus failed, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.2.1.B.2)

2) FAILURE: INADVERTENT OUTPUT

05-6KA-2185-2

3/1R PFP, CIL

ARCS-2000,2002

3/3

ISSUE: NASA FMEA contains multiple failures (driver failed on, RJD command, manifold isolation valve failed, tank isolation valve failed, main bus failed off, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.2.1.B.2)

3) FAILURE: INADVERTENT OUTPUT

05-6KA-2220<u>-</u>2

3/1R PFP, CIL

ARCS-1996,1998

3/3

ISSUE: NASA FMEA contains multiple failures (driver failed on, RJD command, manifold isolation valve failed, tank isolation valve failed, main bus failed off, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims this driver inadvertently operating alone has no effect. (see 4.2.1.B.2)

4.2.2.3.B.3 Relays (1 issue)

1) FAILURE: INADVERTENT OPERATION

05-6KA-2130-2

3/1R PPP

ARCS-2024,2026,2028

3/3

ISSUE: NASA FMEA contains multiple failures (RJD command, relay failed closed, manifold isolation valve failed, tank isolation valve failed, main bus failed, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims the latching relay failing closed alone has no effect. (see 4.2.1.B.2)

4.2.2.3.B.4 Toggle Switches (2 issues)

1) FAILURE: INADVERTENT OPERATION

05-6KA-2036-2 3/1R PPP ARCS-12262,12272,12282,12292 3/3 12263,12273,12283,12293

ISSUE: NASA FMEA contains multiple failures (RJD command, manifold isolation valve failure, tank isolation valve failure, main bus failure, causing inadvertent or uncontrollable thruster firing). IOA-RCS claims the switch inadvertently operating alone has no effect. (see 4.2.1.B.2)

2) FAILURE: FAILS TO CONDUCT ONE OR MORE CONTACT SET

05-6KA-2035-1 3/1R PFP, CIL ARCS-12256,12260 3/1R PFP (or 2/2), CIL 12276,12280

ISSUE: IOA-RCS agrees with NASA FMEA criticalities and screens for manifolds 1-4 (3/1R PFP). However, IOA-RCS recommends the manifold 5 failure also be included in the effects as a 2/2 condition.

4.2.2.3.B.5 Pressure Sensors (3 issues)

1-3) FAILURE: INDICATES HIGHER OR LOWER PRESSURE THAN ACTUAL

NO FMEA ARCS-2286,2287,2288 3/2R PPP

ISSUE: Redundancy management may fail jets. Vernier jet activity may be limited. IOA-RCS recommends these failures be incorporated into a FMEA. Note: Existing FMEA on pressure sensors contain only the primary jets.

4.2.2.3.B.6 Temperature Sensors (2 issues)

1-2) FAILURE: INDICATES HIGHER OR LOWER TEMPERATURE THAN ACTUAL

NO FMEA ARCS-2296,2297 3/2R PPP

ISSUE: Redundancy management may fail jets. Vernier jet activity may be limited. IOA-RCS recommends these failures be incorporated into a FMEA. Note: Existing FMEA on temperature sensors contain only the primary jets.

4.2.2.4 Thermal Control Subsystem (8 issues)

4.2.2.4.A Hardware

IOA analyzed and assessed thermal control subsystem items as EPD&C items. See 4.2.2.4.B for assessment results.

4.2.2.4.B EPD&C (8 issues)

4.2.2.4.B.1 Thermal Switches (8 issues)

1-3) FAILURE: FAILS OPEN

NO FMEA

ARCS-2334,2336,2338

3/2R PPP

ISSUE: Propellant in jet may freeze. Redundancy provided with jets on other manifolds. If jet is required, orbiter may orient itself toward solar heating. This may effect mission operations.

4-6) FAILURE: FAILS HIGH

NO FMEA

ARCS-2335,2337,2339

3/3

ISSUE: Thermostat failing high provides continuous power to jet heaters. Heaters can be switched off. No effect.

7) FAILURE: FAILS OPEN

NO FMEA

ARCS-2340

2/2

<u>ISSUE:</u> Propellant in jet may freeze. No redundancy provided. This may effect mission operations.

8) FAILURE: FAILS HIGH

NO FMEA

ARCS-2341

3/3

ISSUE: Thermostat failing high provides continuous power to jet heaters. Heaters can be switched off. No effect.

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4.3 Additional Comments and Concerns

During the assessment of the NASA RCS FMEA/CIL, IOA identified several areas of concern which are not evinced by the individual failure mode issues presented in this report. These concerns are discussed in the following hardware and EPD&C sections. Several general comments about the IOA assessment and resolution process are also given.

4.3.A Hardware Comments and Concerns

The IOA RCS hardware FMEA and CIL assessments were performed on the NASA/RI FMEA/CIL reevaluation information received by IOA as of 1/01/88. Any updates or changes in this information made by NASA/RI after this date are not reflected in this report. The IOA assessment of the RCS hardware CILs was performed against the post-CCB CIL package dated 12/05/87. This information was presented at RCS PRCB on 23 December 1987. The IOA assessment of the RCS hardware FMEAs (non-CILs) was performed against a criticality and screen summary package dated 9/03/87. For the FMEA (non-CIL) assessment, IOA had only criticality and screen information. The "effects" and other areas listed on a FMEA sheet could not be assessed. Updated FMEA sheets were not generated by NASA/RI.

RCS thermal control and instrumentation items are covered on the NASA RCS hardware FMEA/CIL, however IOA analyzed and assessed these items as EPD&C items. See the EPD&C portions of this report for the assessment results on these items.

Each of the hardware issues in this report have been discussed with the NASA RCS subsystem manager (SSM). The SSM has indicated agreement with a number of the IOA issues, however all issues remain classified by IOA as "open". IOA does not consider an issue to be resolved until it is either incorporated into the NASA FMEA/CIL, or withdrawn by IOA.

On the current NASA FMEA/CIL, one FMEA or CIL sheet may include several components and/or failure modes. The criticality and screens assigned on the FMEA or CIL reflect only the worst case component failure mode. IOA accepted this practice since the components and failure modes are addressed. However, IOA is concerned that this lumping of components and failure modes on individual FMEAs and CILs reduces insight into RCS subsystem failures. Many of the components and failure modes lumped together on one FMEA or CIL would have different criticality and screen assignments if they were separated onto individual FMEAs and CILs, and better insight would be obtained. For example, the vernier thruster assembly FMEAs (03-2F-131310 and 03-2A-231310) include the inlet valves, injector, thrust chamber, nozzle extension, heater, insulation, pressure transducer, and temperature transducer. These vernier thruster components are at the same level of detail as the same primary thruster components which are separated onto individual FMEAs and CILs. A better

understanding of the failures of each of the vernier thruster components could be obtained if they were separated onto individual FMEAs and CILs and assigned unique criticalities. IOA recommends a more consistent level of detail on the NASA RCS hardware FMEA/CIL, and less lumping of components and failure modes on FMEAs and CILs.

Related to this concern are the issues raised by IOA that leakage of valve housings should be addressed on the FMEA/CIL. IOA recommended that a new FMEA and CIL be generated for each valve housing, however accepted the lumping of all valve housings on the two existing helium and propellant line leakage FMEAs.

Some RCS subsystem failures do not exist as "failure modes" on current FMEAs and CILs. Instead, they are listed only as causes on FMEAs and CILs for other failure modes. IOA questions whether a critical RCS failure mode listed only as a cause on a FMEA or CIL receives adequate attention. All critical failures should be listed as failure modes on FMEAs and CILs to ensure that they receive the appropriate amount of attention.

4.3.B EPD&C Comments and Concerns

IOA takes issue with the NASA interpretations of NSTS 22206, Section 2.1.s, page 2-4, the definition of redundancy. The NASA-applied definition of the redundancy string allowed the selection of specific failures which were required to cause known problems, i.e., failures required to cause continuous power to the AC motor valves, or failures required to apply continuous power to the manifold 5 solenoid valve. IOA considers this definition of redundancy to be related more to a Hazard Analysis rather than a FMEA/CIL analysis and considers many NASA redundancy strings to include multiple failures.

IOA analyzed the specific function of the item and determined the impact of the failure. Per NSTS 22206 interpretation, the redundancy string was defined as any other item that is capable of performing the specific function of this item. Criticalities were then assigned based on this redundancy.

This discrepancy was discussed at a meeting with the NASA subsystem manager. In general, the NASA definition tended to be more conservative (assigned a more severe criticality on the FMEA). However, IOA was requested to follow NSTS 22206. The difference in interpretations accounts for the high number of issues cited.

Also at the meeting with the subsystem manager, IOA presented the issue concerning closing a valve to isolate a leak with the GPC. The subsystem manager stated that the GPC is not used to isolate a leak since the software has to be manually loaded. Due to time limitations, IOA was not able to extract all these issues concerning this out of this report.

An extensive amount of re-analysis was done for the assessment report. Since the manifold 5 isolation valve wiring changed after the IOA analysis was complete, IOA completely re-analyzed the new design. Additionally, all diodes and switches were re-analyzed in efforts to match the NASA FMEA breakdown for these items.

5.0 REFERENCES

Reference documentation available from NASA and Rockwell was used in the analysis. The documentation used included the following:

- 1. Reaction Control System Workbook, RCS 2102, March 3, 1980
- Reaction Control System Shuttle Flight Operations Manual, Volume 8D, March 31, 1980
- 3. OMS/RCS Systems Briefs Handbook, October 1, 1984
- 4. STS Operational Flight Rules Rationale, December 16, 1985 and PCN-1, February 14, 1986
- 5. NSTS 22206, Instructions for Preparation of FMEA and CIL, October 10, 1986.
- 6. Reliability Desk Instruction, No. 100-2G, Flight Hardware FMEA & CIL, 1-31-84.
- 7. VS70-942102 Rev. G, 6-7-84, FRCS Integrated System Schematics, 102, RI Level III.
- 8. VS70-942099 Rev. D, EOD01, 8-30-84, FRCS Integrated System Schematics, 099, 103, 104, RI Level III.
- 9. VS70-943099, Rev. B, EOB12, 7-22-85, OMS/RCS Integrated System Schematics, 099, 103, 104, RI Level III.
- 10. VS70-943102, Rev. C, 10-29-80, OMS/RCS Integrated System Schematics, 102, RI Level III.
- 11. MB0160-007, Rev M, 3-11-80, Steel Tubing, Mat'l spec., RI.
- 12. MC276-0017, Rev D, 6-23-84, Helium High Pressure Coupling, Proc. spec., RI.
- 13. MC276-0018, Rev B, 2-14-84, Hypergolic Service Coupling, Proc. spec., RI.
- 14. MC282-0082, Rev D, 3-17-82, Pressurant Storage Tank, Proc. spec., RI.
- 15. MC284-0421, Rev E, 5-3-82, Pressure Relief Valve, Proc. spec., RI.
- 16. MC284-0430, Rev E, 6-22-81, AC Motor Valve, Proc. spec., RI.
- 17. MC284-0480, Rev C, 5-3-82, Manual Operated Valve, Proc. spec., RI.
- 18. MC284-0481, Rev B, 6-23-84, Quad Check Valve, Proc. spec., RI
- 19. MC363-0031, Rev C, 3-15-78, Electrical Heater, Detail Proc.

spec., RI.

- 20. ME276-0032, Rev B, 7-20-79, Test Point Coupling, Spec. Control Dwg., RI.
- 21. AMS5562A, 7-15-80, Steel Tubing, Mat'l spec., SAE.
- 22. 73P550015, Rev B, 3-22-82, Gimbal Bellows, Proc. spec., MDAC.
- 23. 73P550003 Alignment Bellows Drawing, MDAC.
- 24. MC282-0061, Rev. G, RCS Propellant Tank, Proc. Spec., MDAC.
- 25. MC271-0095, RCS Propellant Line Flexible Assembly, Proc. Spec., MDAC.
- 26. MC467-0029, Rev. G, RCS Vernier Thruster Assembly, Proc. Spec., MDAC.
- 27. VS70-420309, Rev. D, 6-4-84, Aft RCS Subsystem Control Left OMS Pod Schematic Diagram.
- 28. JSC-11174, Space Shuttle Systems Handbook, Rev. C, DNC-5, 9-13-85.

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APPENDIX A ACRONYMS

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AC

    Alternating Current

        - Aft Load Controller
ALC
        - Aft Load Control Assembly
ALCA
           Aft Motor Control Assembly
AMCA
        - Abort-Once-Around
AOA
APC

    Aft Power Controller

        - Aft Reaction Control System (Subsystem)
ARCS
        - Assembly
ASSY
ATO

    Abort-To-Orbit

ATT
        - Attitude
        - Bus Control ELement
BCE
        - Backup Flight System
BFS

    Bus Terminal Unit

BTU
        - Caution and Warning
C&W
        - Critical Items List
CIL
        - Close (Closed)
CL
CMD

    Command, Commander

CNTL
           Control
          Controller
CNTLR
CRIT

    Criticality

           Cathode-Ray Tube
CRT
           Displays and Controls
D&C
        - Digital Autopilot
DAP
dc

    Direct Current

         Department of Defense
DOD

    Data Processing System (Subsystem)

DPS
DTO
        - Detailed Test Objective
        - Entry Interface
ΕI
        - Electrical Power Distribution and Control
EPDC
        - External Tank
ET
F
           Fahrenheit
F
          Functional

    Flight Aft

FA ·
           Flight Control Operating System
FCOS
          Fault Detection and Annunciation
FDA
           Flight Forward
\mathbf{F}\mathbf{F}
          Forward Load Control Assembly
FLCA
           Flight
FLT
           Failure Mode
FM
           Forward Motor Control Assembly
FMCA
           Failure Modes and Effects Analysis
FMEA
           Forward Reaction Control System (Subsystem)
FRCS
FSW
           Flight Software
           Feet
ft
           Fuel
FÙ
           Function
FUNC
        Forward
FWD
G
           Gravity
           Government Furnished Equipment
GFE
        - Guidance, Navigation, and Control
GNC
           General Purpose Computer
GPC
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- Ground Support Equipment - Helium He - Hardware HW I/C - Interconnect - Input/Output I/0 - Inside Diameter ID IOA ISOL ISP -JSC L - Inertial Measurement Unit - Independent Orbiter Assessment - Isolation - Initial Specific Impulse - Johnson Space Center - Left LCA - Load Controller Assembly LRU - Line Replaceable Unit - Manual MAN - Motor Control Assembly MCA - Mission Control Center (JSC) MCC MDAC MDM MECO - McDonnell Douglas Astronautics Company Multiplexer/Demultiplexer - Main Engine Cutoff - Major Mode MM MMH Monomethyl Hydrazine msec N2O4 NA - Millisecond - Nitrogen Tetroxide - Not Applicable NA - National Aeronautics and Space Administration NASA - National Space Transportation System NSTS - Nitrogen Tetroxide NTO OA -- Operational Aft - Operational Forward OF OI - Operational Instrumentation - Operational Maintenance Requirements and OMRSD Specifications Document - Orbital Maneuvering System OMS OP - Open - Operations Sequence OPS - Oxidizer OX OXID - Oxidizer - Pitch P - Propellant Acquisition Device PAD PASS PBI - Primary Avionics Software System - Push-Button Indicator - Chamber Pressure Pc PCA - Power Control Assembly.... PCI PCM - Potential Critical Item - Pulse Code Modulation PCMMU - Pulse Code Modulation Master Unit - Primary Landing Site PLS - Primary Reaction Control System (jet) PRCS PRESS - Pressure PROC psi - Processor - Pounds per Square Inch psia - Pounds per Square Inch Absolute
psid - Pounds per Square Inch Differential
psig - Pounds per Square Inch Gage

Programmed Test Input PTI PWR Power R Right Roll R Reaction Control System RCS - Rotation Hand Controller RHC Rockwell International RI - Reaction Jet Driver RJD- Redundancy Management RM Remote Power Controller RPC - Return-to-Launch Site RTLS Standard Cubic Feet per Minute scfm Shuttle Flight Operations Manual SFOM Subsystem Operating Program SOP Specification SPEC Subsystem Manager SSM Space Shuttle Systems Handbook SSSH Space Transportation System STS SUM Summary System SYS Transatlantic Abort Landing TAL Translation Hand Controller THC Tank ΤK Thermal Protection System TPS - Vernier VERN VLV Valve - Vernier Reaction Control System (jet) VRCS Y Yaw

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APPENDIX B

DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

- B.1 Definitions
- B.2 Project Level Ground Rules and Assumptions
 B.3 RCS-Specific Ground Rules and Assumptions

APPENDIX B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.1 Definitions

Definitions contained in <u>NSTS 22206</u>, <u>Instructions For Preparation of FMEA/CIL</u>, 10 October 1986, were used with the following amplifications and additions.

INTACT ABORT DEFINITIONS:

RTLS - begins at transition to OPS 6 and ends at transition
to OPS 9, post-flight

TAL - begins at declaration of the abort and ends at transition to OPS 9, post-flight

AOA - begins at declaration of the abort and ends at transition to OPS 9, post-flight

ATO - begins at declaration of the abort and ends at transition to OPS 9, post-flight

<u>CREDIBLE (CAUSE)</u> - an event that can be predicted or expected in anticipated operational environmental conditions. Excludes an event where multiple failures must first occur to result in environmental extremes

<u>CONTINGENCY CREW PROCEDURES</u> - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

<u>EARLY MISSION TERMINATION</u> - termination of onorbit phase prior to planned end of mission

EFFECTS/RATIONALE - description of the case which generated the
highest criticality

HIGHEST CRITICALITY - the highest functional criticality
determined in the phase-by-phase analysis

MAJOR MODE (MM) - major sub-mode of software operational sequence
(OPS)

MC - Memory Configuration of Primary Avionics Software System
(PASS)

MISSION - assigned performance of a specific Orbiter flight with payload/objective accomplishments including orbit phasing and altitude (excludes secondary payloads such as GAS cans, middeck P/L, etc.)

= :

MULTIPLE ORDER FAILURE - describes the failure due to a single cause or event of all units which perform a necessary (critical) function

<u>OFF-NOMINAL CREW PROCEDURES</u> - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

OPS - software operational sequence

<u>PRIMARY MISSION OBJECTIVES</u> - worst case primary mission objectives are equal to mission objectives

PHASE DEFINITIONS:

PRELAUNCH PHASE - begins at launch count-down Orbiter
power-up and ends at moding to OPS Major Mode 102 (liftoff)

<u>LIFTOFF MISSION PHASE</u> - begins at SRB ignition (MM 102) and ends at transition out of OPS 1 (Synonymous with ASCENT)

ONORBIT PHASE - begins at transition to OPS 2 or OPS 8 and ends at transition out of OPS 2 or OPS 8

<u>DEORBIT PHASE</u> - begins at transition to OPS Major Mode 301 and ends at first main landing gear touchdown

LANDING/SAFING PHASE - begins at first main gear touchdown and ends with the completion of post-landing safing operations

APPENDIX B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.2 IOA Project Level Ground Rules and Assumptions

The philosophy embodied in NSTS 22206. Instructions for Preparation of FMEA/CIL, 10 October 1986, was employed with the following amplifications and additions.

1. The operational flight software is an accurate implementation of the Flight System Software Requirements (FSSRs).

RATIONALE: Software verification is out-of-scope of this task.

2. After liftoff, any parameter which is monitored by system management (SM) or which drives any part of the Caution and Warning System (C&W) will support passage of Redundancy Screen B for its corresponding hardware item.

RATIONALE: Analysis of on-board parameter availability and/or the actual monitoring by the crew is beyond the scope of this task.

3. Any data employed with flight software is assumed to be functional for the specific vehicle and specific mission being flown.

RATIONALE: Mission data verification is out-of-scope of this task.

4. All hardware (including firmware) is manufactured and assembled to the design specifications/drawings.

RATIONALE: Acceptance and verification testing is designed to detect and identify problems before the item is approved for use.

5. All Flight Data File crew procedures will be assumed performed as written, and will not include human error in their performance.

RATIONALE: Failures caused by human operational error are out-of-scope of this task.

6. All hardware analyses will, as a minimum, be performed at the level of analysis existent within NASA/Prime Contractor Orbiter FMEA/CILs, and will be permitted to go to greater hardware detail levels but not lesser.

RATIONALE: Comparison of IOA analysis results with other analyses requires that both analyses be performed to a comparable level of detail.

7. Verification that a telemetry parameter is actually monitored during AOS by ground-based personnel is not required.

RATIONALE: Analysis of mission-dependent telemetry availability and/or the actual monitoring of applicable data by ground-based personnel is beyond the scope of this task.

8. The determination of criticalities per phase is based on the worst case effect of a failure for the phase being analyzed. The failure can occur in the phase being analyzed or in any previous phase, whichever produces the worst case effects for the phase of interest.

RATIONALE: Assigning phase criticalities ensures a thorough and complete analysis.

9. Analysis of wire harnesses, cables, and electrical connectors to determine if FMEAs are warranted will not be performed nor FMEAs assessed.

RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

10. Analysis of welds or brazed joints that cannot be inspected will not be performed nor FMEAs assessed.

RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

11. Emergency system or hardware will include burst discs and will exclude the EMU Secondary Oxygen Pack (SOP), pressure relief valves and the landing gear pyrotechnics.

RATIONALE: Clarify definition of emergency systems to ensure consistency throughout IOA project.

APPENDIX B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS

B.3 RCS - Specific Groundrules and Assumptions

B.3.A Hardware

- 1. The function of an RCS thruster is to provide thrust in a certain axis and direction. Therefore, from a top down system analysis approach, thrusters which fire in the same axis and direction may be considered redundant to each other.
- 2. All aft RCS thrusters are required for the successful completion of OMS/RCS propellant dumps during RTLS and TAL aborts.
- 3. It is assumed that after the failure of an RCS thruster, the RCS redundancy management will automatically deselect the opposite-firing thruster.
- 4. Any leakage of RCS propellants is potentially life and vehicle threatening regardless of where the leak occurs (NSTS 22206, p. 2-11, item h). IOA classifies any single failure which results in propellant leakage as a 1/1. If redundant items must fail before leakage occurs, IOA assign a functional criticality 1R.
- failure mode for the helium tank isolation valves, propellant tank isolation valves, manifold isolation valves, and crossfeed valves does not include a failure which requires that the valve be closed.
- 6. Inability to deplete propellants or complete planned propellant dumps can lead to violations of orbiter entry mass properties constraints and/or violations of propellant tank landing weight constraints (ARCS only).

B.3.B EPD&C

- 1. IOA-RCS assumed the inability to re-open a valve on ascent is not a credible event. These valves (helium isolation valve A & B, tank isolation valves 1/2 & 3/4/5, and manifold isolation valves 1-5) are open prelaunch and are used to supply propellants to jets for control, ET separation, and RTLS/TAL aborts.
- 2. IOA-RCS assumed if a valve was closed for some reason (i.e. isolate a leak) after ascent, the inability to re-open this valve was a credible failure and the reason to close was not in the redundancy string.
- 3. The above valves and the aft crossfeed valves can be

configured manually or with the GPC. The primary and secondary application of these commands depends on the mission phase. For secondary application, IOA-RCS issued a "NA" for the B screen since this would be a stand-by function.

- 4. IOA-RCS issued a "NA" for B screens for all electrical components failed open that are used to isolate a leak. Isolation of a leak is a stand-by function. If a failed short item causes inability to isolate a leak (valve failed open), this item has the applicable B screen assigned to it.
- 5. IOA-RCS assumed that loss of logic power for reaction jet drivers on ascent was not a credible failure since multiple failures (driver power circuit failed off) must occur. However, after ascent, driver power is turned off during sleep periods. Inability to turn on logic power, thus driver power, is now credible. This causes loss of jets on associated manifolds.
- 6. MDM discretes and the event indicators provide the logic and visual status of the valve position. Resistors, diodes, and hybrid drivers are used in the circuitry that provide this data. IOA-RCS claims the failure of these items may lead to a false indication of the valve position. The worst effect of these indicators would be to falsely fail the valve closed which may effect on-orbit operations.
- 7. An issue has been made of all RLR type resistors with a short failure mode with a 3/3 criticality. This type resistor cannot fail short. Updated FMEAs have not been received to delete this failure mode.
- 8. Electrical components within the valve (microswitches, diodes, etc) have been analyzed for the assessment report. This analysis is shown in Appendix E.
- 9. All switches have been re-analyzed for the assessment report. They have been broken into five categorical groups. This analysis is shown in Appendix E.
- 10. Diodes have been re-analyzed for the assessment report. The diodes have been broken out into the seven groups (depending on the function of the diode in the circuit) as shown below:
 - x Limit switches or Talkback
 - A GPC close
 - B GPC open
 - C Manual open
 - D Manual close
 - E Manual open/close inhibit
 - F Manual close/open inhibit

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APPENDIX C DETAILED ASSESSMENT

This section contains the IOA assessment worksheets generated during the assessment of this subsystem. The information on these worksheets facilitates the comparison of the NASA FMEA/CIL (Pre and Post 51-L) to the IOA detailed analysis worksheets included in Appendix E. Each of these worksheets identifies the NASA FMEA being assessed, corresponding MDAC Analysis Worksheet ID (Appendix E), hardware item, criticality, redundancy screens, and recommendations. For each failure mode, the highest assessed hardware and functional criticality is compared and discrepancies noted as "N" in the compare row under the column where the discrepancy occurred.

LEGEND FOR IOA ASSESSMENT WORKSHEETS

Hardware Criticalities:

- 1 = Loss of life or vehicle
- 2 = Loss of mission or next failure of any redundant item (like or unlike) could cause loss of life/vehicle
- 3 = All others

Functional Criticalities:

- 1R = Redundant hardware items (like or unlike) all of which,
 - if failed, could cause loss of life or vehicle
- 2R = Redundant hardware items (like or unlike) all of which, if failed, could cause loss of mission

Redundancy Screens A, B and C:

- P = Passed Screen
- F = Failed Screen
- NA = Not Applicable

NASA Data:

Baseline = NASA FMEA/CIL

New = Baseline with Proposed Post 51-L Changes

CIL Item :

X = Included in CIL

Compare Row:

N = Non compare for that column (deviation)

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-100									
SUBSYSTEM: MDAC ID: ITEM:	FRCS 100 HELIUM STO	RAGE TA	NK		4					
LEAD ANALYST:	C.D. PRUST	?	•							
ASSESSMENT:										
CRITICAL: FLIGHT		ENS		CIL						
HDW/FU			В	С						
NASA [1 /1 IOA [1 /1] [] []	[]	[X] *			
COMPARE [/] [] []	[]	[]			
RECOMMENDATIONS:	(If diff	erent f	rom NAS	SA)						
- [₋ /] [] []	[-] (AI	[D/D] ELETE)			
* CIL RETENTION	RATIONALE:	(If app	licable	AD	EQUATE EQUATE	[]			
REMARKS: NO DIFFERENCES. ABOUT POSSIBLE VI CONSTRAINTS.	REMARKS: IO DIFFERENCES. IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF THE ORBITER ENTRY MASS PROPERTIES									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-101	S-101 BASELIN -2F-101070-1 NE								
SUBSYSTEM: MDAC ID: ITEM:	FRCS 101 HELIUM FILL									
LEAD ANALYST:	C.D. PRUST	D. PRUST								
ASSESSMENT:										
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C										
HDW/FC	JNC A	В С								
NASA [2 /11 IOA [2 /11	R] [F] R]	[F] [P] [NA]	[X] * [X]							
COMPARE [/] [N]	[N]	[]							
RECOMMENDATIONS	(If differ	ent from NASA)	English state							
- [/] []	[] []	[] (ADD/DELETE)							
* CIL RETENTION	* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []									
REMARKS: IOA AGREES WITH NASA/RI FAILURE OF A AND B SCREENS. CONDITION OF CAP SEALS UNDETECTABLE AFTER CAP INSTALLATION. IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS REGARDING POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS.										

ASSESSME ASSESSME NASA FME	NT	II) :	RCS	-10	2	.070-	NASA DAT BASELIN 70-2 NE							_	
SUBSYSTE MDAC ID: ITEM:				FRC 102 HEL		FI	LL C	COUE	LI	NG						
LEAD ANA	LYS	T:		C.D	. P	RUS	T			•						
ASSESSME	ENT:															
										CII						
			/FU			A	\		В			С				
NASA IOA	[3 3	/3 /3]		[]	[]]]		[]	*
COMPARE	C		/]		[]	[1	[]		[]	
RECOMMEN	IDAT	ΊC	NS:	(Ιf	dif	fere	ent	fr	om N	ASA)					
-	[/]		[}	[]	[3	(A	[DD/I		
* CIL RE	TEN	ΤI	ОИ	RATI	ONA	LE:	(If	far	pl	icab	le)			_	_	
		-									IN	ADEQU ADEQU		-]	
REMARKS: NO DIFFE INCLUDE	REN													SHO	OUL	D

	ASSESSME ASSESSME NASA FME	NT	II		RCS	-103		020)-3					ASA DA BASELI N	NE	[[]		
	SUBSYSTE MDAC ID: ITEM:				FRC 103 HE		A	&	B VL	/S									
	LEAD ANA	LY	ST	•	C.D	. PR	US!	r			•								
	ASSESSMENT:																		
CRITICALITY REDUNDANCY SCREENS FLIGHT									CIL										
]	_	/FUI			A			В			С				ra.		-
	NASA IOA			/1R /1R]	P P]	[P P]	[P P]		[]	*	
	COMPARE	[/]	[]	[]	[]		[]		
	RECOMMEN	DA'	ri(ONS:	(If d	if:	fer	ent :	Ero	om N	IASA)) .						
	. - .	ָרָ בּ	3 -	/1R]	[P]	[F]	[P]		[A DD/D)
	* CIL RE	TE	NT:	ION 1	RATI	ONAL	E:	(I	f app	91 :	icab			DEQUAT DEQUAT]		
	REMARKS: IOA NOW RECOMMENDS THAT THE B SCREEN BE FAILED AND THAT THIS ITEM AND FAILURE MODE BE PLACED ON THE CIL. A FAILURE OF THE REDUNDANT SECONDARY REG IS NOT DETECTABLE IN FLIGHT. IOA RECOMMENDS THE ADDITION OF A STATEMENT TO THE EFFECTS REGARDING POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS.																		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-103			N.	ASA DATA: BASELINE NEW	[]		
SUBSYSTEM: MDAC ID: ITEM:	FRCS 103 HE ISOL	A & B	VLVS						
LEAD ANALYST:	C.D. PRI	UST		•					
ASSESSMENT:									
CRITICALI FLIGHT	r					CIL ITEM			
HDW/FU	1C	A	В	С					
NASA [/ IOA [3 /1R] [p]	[p]	[[P]	[] *]		
COMPARE [N /N] [иј	[и]	[N]	[]		
RECOMMENDATIONS:	(If d	ifferen	t from	n NASA)					
_ · [3 /1R] [P]	[F]	[P) (AD	[A D/DE] LETE)		
* CIL RETENTION B	RATIONAL	E: (If	applic	able) A INA	DEQUATE DEQUATE	[]		
REMARKS: NASA/RI DO NOT CO	OVER THIS	S FAILU	RE MOD	E (INTE	RNAL LEAK	(AGE)	. THE		
SSM AGREED THAT THIS FAILURE MODE SHOULD BE ADDED TO 03-2F- 101020-3 (FAILS OPEN), WHICH IS CLASSIFIED AS A 3/1R PPP. IOA NOW RECOMMENDS A 3/1R PFP FOR 03-2F-101020-3. SEE ASSESSMENT SHEET RCS-103.									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-104	CS-104 BASELINE								
MDAC ID:	FRCS 104 HE ISOL	A & B VL	/S							
LEAD ANALYST:	C.D. PR	UST								
ASSESSMENT:	ASSESSMENT:									
CRITICALITY REDUNDANCY SCREENS FLIGHT										
	NC	A	B ·	С						
NASA [3 /1R IOA [2 /1R] [P] [P] [P] [NA] [P] P]	[x] *					
COMPARE [N /] [] [и] []	[N]					
RECOMMENDATIONS:	(If d	ifferent :	from NASA	A)	78.027					
[2 /1R	.] [P] [P] ([A] DD/DELETE)					
* CIL RETENTION	RATIONAL	E: (If ap		ADEQUATE	[]					
REMARKS: IOA ACCEPTS NASA THIS ITEM AND FA THE CIL. INABIL INABILITY TO USE ENTRY MASS PROPE	ILURE MO LITY TO R OR DEPL	DE BE UPG EPRESS FROE ETE PROP	RADED TO CS PROP T COULD RES	A 2/1R AND TANK AND SU SULT IN VIO	PLACED ON BSEQUENT LATIONS OF					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-105	1	NASA DA' BASELII N							
SUBSYSTEM: MDAC ID: ITEM:	FRCS 105 HE LINE, ALL	EXCEPT ISC	OL VLV TO PI	RESS REGULATOR						
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
CRITICAL FLIGH HDW/FU	T	DANCY SCRI B	eens C	CIL ITEM						
NASA [1 /1 IOA [1 /1] []	[]	[]	[X] *						
COMPARE [/] []	[]	[]	[]						
RECOMMENDATIONS:	(If differe	nt from NA	ASA)							
[/] []	[]	[].	[] (ADD/DELETE)						
	* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []									
REMARKS: NO DIFFERENCES. IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS REGARDING POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS. THIS FMEA SHOULD ALSO INCLUDE HELIUM COMPONENT BODIES IN THE ITEM LIST AND CORRESPONDING RETENTION RATIONALE. THE SSM AGREED THAT VALVE BODIES SHOULD BE ADDED.										

ASSESSMENT DA' ASSESSMENT ID NASA FMEA #:	RCS-1					SA DATA ASELINE NEW]		
SUBSYSTEM: MDAC ID: ITEM:	106	NE, ALI	EXCE	PT IS	or ara	TO PRES	ss R	EGULATOR		
LEAD ANALYST:	C.D.	PRUST								
ASSESSMENT:										
	CALITY IGHT	REDU	INDANC	Y SCR	EENS		CIL			
HDW	FUNC	A		В	С			••		
NASA [IOA [1	/] /1]	[.] []	[[]	[]	[x] *		
COMPARE [N	/N]	[]	[]	[] .	[N]		
RECOMMENDATIO	NS: (If	differ	ent f	rom N	ASA)					
[.	/]	[]	[, 1	[] (A)] ELETE)		
* CIL RETENTI	ON RATION	ALE: (]	If app	olicab	ole) AD INAD	EQUATE EQUATE	[]		
REMARKS: NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 1/1 EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.										

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-107 03-2F-101013-	BASI	ELINE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 107	L VLV TO PRESS REGU	ULATOR
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
CRITICAL FLIGH		NDANCY SCREENS	CIL ITEM
	NC A	в с	
NASA [1 /1 IOA [2 /1R] []]	[] [] [P]	
COMPARE [N /N] [N]	[N] [N]	[]
RECOMMENDATIONS:	(If differe	ent from NASA)	
[/] []	[] []	[] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (I	f applicable) ADEQI INADEQI	UATE [] UATE []
REMARKS:	AVATORDO MUE		
TOA ORIGINALLY C	ONSIDERED THE	PARALLEL LINE SEG WEVER, IOA AGREES V	MICHIS OF THE 1300
CRIT 1/1 ASSIGNM	ENT. TOA RECO	OMMENDS ADDING A ST	TATEMENT TO THE
EFFECTS REGARDIN	G POSSIBLE VIO	OLATIONS OF ORBITE	R ENTRY MASS
PROPERTIES CONST	RAINTS. THIS	FMEA SHOULD ALSO	INCLUDE HELIUM
COMPONENT BODIES	IN THE ITEM	LIST AND CORRESPON	DING RETENTION
RATIONALE. THE	SSM AGREED THA	AT VALVE BODIES SHO	OOPD DE WDDED.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-108		N	NASA DATA: BASELINE NEW	[]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 108 HE LINE,	ISOL VLV	TO PRESS	REGULATOR	L
LEAD ANALYST:	C.D. PRUS	T			
ASSESSMENT:					
CRITICAL FLIGH HDW/FU					CIL
NASA [/ IOA [2 /1R] [] [P] [?]	[
COMPARE [N /N] [N] [N] [1	4]	[N]
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)		
] .[] [] [] (AI	[] DD/DELETE)
* CIL RETENTION	RATIONALE:	(If appl	1	ADEQUATE ADEQUATE	[]
REMARKS: NASA/RI DO NOT CONTROL OF CONTROL O	EFORMATION EFFECTS, HO ESTIONABLE R OR COMPO SSED ON TH	(CRIMPIN WEVER THE . ANY CONENT. ICE FMEA/CI	W IN A SIG). SUCH CREDIBINATION RECOMMINATION BUT DO	EGMENT OF H AN OCCUF LITY OF SU ION WOULD ENDS THAT	LINE DUE TO RRENCE COULI JCH AN FLOW TO SUCH A

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-109	1	NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 109 HIGH PRESSURE	HELIUM TEST	PORT COUPI	LINGS A & B
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAL FLIGH HDW/FU		DANCY SCREENS B	c c	CIL ITEM
NASA [3 /1R IOA [3 /1R] [F]] [P]	[F] [[NA] [P] P]	[X] *
COMPARE [/] [N]	[N] [1	[N]·
RECOMMENDATIONS:	(If differe	nt from NASA))	
[3 /1R] [F]	[F] [P] (AI	[A] DD/DELETE)
* CIL RETENTION	RATIONALE: (If		ADEQUATE NADEQUATE	
REMARKS: IOA AGREES WITH	NASA/RT FATLIR	E OF A AND B	SCREENS.	TOA
RECOMMENDS THAT				
THIS FMEA/CIL.				
ON OTHER QD FMEA				
THE SSM AGREED W				
STATEMENT TO THE ENTRY MASS PROPE			VIOLATION	IS OF ORBITER
ENIKI MADO PKUPE	KIILO CUIDIKAL	NTO.		

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: RCS-110 NASA FMEA #: 03-2F-101091-2									ASA DATA BASELINE NEW]
SUBSYSTEM: MDAC ID: ITEM:			FRCS 110 HIGH P	RESS	URE H	ELIU	M TES	T P	ORT COUR	PLINGS	SA&B
LEAD ANALY	ST:		C.D. P	RUSI							
ASSESSMENT	! :										
CR	CALI	TY T	RE	DUNDA	NCY	SCREE			CIL ITE	1	
	HDW	/FUI	IC	A		В		С			
NASA [IOA [3	/3 /3]	[]	[]	[]	[] *
COMPARE [/]	[]	[]	[1	C]
RECOMMENDA	TIC	ons:	(If	diff	erent	fro	om NAS	SA)			
[3	/3]	[]	[]	[] (2	[ADD/D:] ELETE)
* CIL RETE	ENTI	2. 1	RATIONA	ALE:	(If a	appl:	icable	A	DEQUATE DEQUATE]
REMARKS: IOA FAILUF COUPLE" AN FLOW" BE A CREDIBLE F THE SSM AC	' DV ADDI FAII	'RES' ED A LURE	TRICTEI S A FAI MODE A	D FLO LLURI AND :	DW". E MODI IS ADI	IOA E ON DRES	RECON THIS	MEN FME	DS THAT	"RES' S IS	TRICTED A

ASSESSMENT I NASA FMEA #:	D. BCC-1	7 7		BASELINE [] NEW [X]					
SUBSYSTEM: MDAC ID: ITEM:	FRCS 111 HE PR	ESS REGUL	ATOR ASSE	MBLY					
LEAD ANALYST	C.D.	PRUST							
ASSESSMENT:									
F	CICALITY		ANCY SCRE		CIL ITEM				
HD	W/FUNC	A	В	С					
NASA [3 IOA [3	/1R] /1R]	[P] [P]	[F] [NA]	[P] [P]	[X] * []				
COMPARE [/ 1	[]	[N]	[]	[N]				
RECOMMENDATI	CONS: (If	differen	t from NA	SA)					
. [/]	[]	[]	[] (A)	[DD/DELETE)				
* CIL RETENT	ION RATION	ALE: (If	applicable						
				ADEQUATE INADEQUATE					
REMARKS: IOA AGREES W RECOMMENDS A VIOLATIONS O	DDING A ST	ATEMENT TO	THE EFF	ECTS REGARDI	NG POSSIBLE				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		NASA DATA: BASELINE [] NEW [X]									
SUBSYSTEM: MDAC ID: ITEM:	FRCS 112 HE PRESS REGULATOR ASSEMBL	.Y									
LEAD ANALYST:	C.D. PRUST										
ASSESSMENT:											
CRITICAL FLIGH	ITY REDUNDANCY SCREENS	CIL ITEM									
	NC A B	С									
NASA [3 /1R IOA [2 /1R	[P] [P] [] [P] [NA] [P] [] * P] [X]									
COMPARE [N /] [] [[] [] [N]									
RECOMMENDATIONS:	(If different from NASA)										
[2 /1R	[P] [F] [P] [A] (ADD/DELETE)									
* CIL RETENTION	RATIONALE: (If applicable)	ADEQUADE []									
	I	ADEQUATE [] NADEQUATE []									
REMARKS: IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 2/1R PFP AND PLACED ON THE CIL. INABILITY TO REPRESS FRCS PROP TANK AND SUBSEQUENT INABILITY TO USE OR DEPLETE PROP COULD RESULT IN VIOLATIONS OF ENTRY MASS CONSTRAINTS AND LOSS OF LIFE OR VEHICLE DURING ENTRY. THIS FAILURE IS UNDETECTABLE DURING DUAL LEG OPERATION AND, THEREFORE, FAILS THE B SCREEN DURING THE ASCENT FLIGHT PHASE.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-113		NASA DATA: BASELINE NEW							
SUBSYSTEM: MDAC ID: ITEM:		LY								
LEAD ANALYST:	C.D. PRUST	C.D. PRUST								
ASSESSMENT:										
CRITICAI FLIGH	LITY REDUNI	DANCY SCREEN	S	CIL ITEM						
	INC A	В	C	TIEM						
NASA [/ IOA [2 /1F	[P]] [] [] [AN]	P]	[x] *						
COMPARE [N /N] [N]	[N] [n j	[N]						
RECOMMENDATIONS:	(If differen	nt from NASA)							
[2 /1	[P]	[F] [P] (AI	[A] DD/DELETE)						
* CIL RETENTION	RATIONALE: (If	applicable)	ADEQUATE NADEQUATE							
REMARKS: NASA/RI DO NOT O SSM AGREED THAT 101030-2 (FAILS PPP. IOA RECOMM SEE ASSESSMENT S	THIS FAILURE MO CLOSED), WHICH ENDS A 2/1R PFI	DDE SHOULD BY IS CURRENTLY	E ADDED TO Y CLASSIFIE	03-2F-						

				EW []			
FRCS 114 HE PRES	114						
C.D. PR	UST						
	REDUND	ANCY SCRE	EENS	CIL ITEM			
	A	В	С	TIBN			
] [p]	[] [NA]	[] [P]	[x] *			
] [n]	[N]	[N]	[N]			
(If d	ifferen	t from NA	ASA)				
] [1	[]	[]	[A] (ADD/DELETE)			
RATIONAL	E: (If	applicab]	le) ADEQUATI INADEQUATI				
THIS VAL TAKAGE FM TALE. IO BE REDUN	VE BODY EA (03- A ORIGI DANT FO	SHOULD F 2F-101013 NALLY CON R THIS FA	BE ADDED TO B-1) WITH CO NSIDERED THI	THE HELIUM ORRESPONDING E PARALLEL			
	HE PRES	HE PRESS REGULE C.D. PRUST LITY REDUND TO A [HE PRESS REGULATOR ASSECTED. C.D. PRUST LITY REDUNDANCY SCREEN TO A B [HE PRESS REGULATOR ASSEMBLY C.D. PRUST LITY REDUNDANCY SCREENS TO B C [] [] [] [] [] [] [] [] [] [

ASSESSMEN' NASA FMEA	T II #:	D:	RCS-115 NONE					BASELINE [] NEW []								
SUBSYSTEM MDAC ID: ITEM:			FRCS 115 HE PRI	ES	5 1	REGUL	AΤC	OR	PR:	IMARY	SENSI	NG P	ORT	•		
LEAD ANAL	YST:	:	C.D. 1	PRI	US!	Г										
ASSESSMEN'	т:															
C	ITY I		R	EDUND	AN	CY	SCI	REENS			CII					
			NC	A B			С			TIEM						
NASA IOA	[2	/ /1R]	[P]	[P]	[[P]		[}]	*	
COMPARE	[N	/N]	[N]	[N]	[1]		[]	[]		
RECOMMEND	ATIC	ons:	(If	d :	if:	feren	t i	fro	om 1	NASA)						
	[3	/2R]	[P]	[F]	[P		(AD	[<i>P</i>	EL	ETE	:)
* CIL RET	ENT	ION 1	RATION	ALI	Ε:	(If	app	91 i	ica)		DEQUA DEQUA	TE TE	[]		
REMARKS: NASA/RI D SENSING P IN THE OM RECOMMEND REGULATOR 2/1R PPP	S SU S TH WIT	JBSY: HAT T I'H TI	STEM ON THIS FA	I V LIA	emi Lui	EA 03 RE MO	-3- DE	-1(AI)04. LSO	-3 (3/ BE CO	2R PF VERED	P). FOR	IC TH	A Œ	RCS	,

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-116		NASA DATA: BASELINE [] NEW []									
SUBSYSTEM: MDAC ID: ITEM:	116	s REGULATO	R PRIMARY S	ENSING I	PORT							
LEAD ANALYST:	C.D. PR	UST										
ASSESSMENT:												
CRITICAL FLIGH HDW/FU	T		y screens B C		CIL ITEM							
•			-									
NASA [/ IOA [2 /1R] [P] []	P] [P]	[x] *							
COMPARE [N /N] [и] [и	и] [и]	[и]							
RECOMMENDATIONS:	(If d	ifferent f	rom NASA)									
, [₁ /] [] [] [] (AI	[] DD/DELETE)							
* CIL RETENTION	RATIONAL	E: (If app	AΓ	EQUATE EQUATE	[]							
REMARKS: THIS FAILURE MOD ADDRESSED ON FME CONTAMINATION OF LINES AS CAUSES ADDITIONAL FMEA	As 03-2F PILOT SO FOR THE	-101030-1 A CREENS, RES REGULATOR I	AND 101030- STRICTOR OF FAILURES CO	-2, WHICH RIFICES, OVERED.	I LIST OR SENSE AN							
03-2F-101030-2.												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-117 03-2F-101091-1	NASA DATA: BASELINE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM:	FRCS	T TEST PORT COUPLING
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		· · · · · · · · · · · · · · · · · · ·
CRITICAL FLIGH	ITY REDUNDANCY SCREE	NS CIL ITEM
HDW/FU	NC A B	C
NASA [3 /1R IOA [2 /1R] [F] [F]] [P] [NA]	[P] [X]* [P] [X]
COMPARE [N /] [N] [N]	[] []
RECOMMENDATIONS:	(If different from NAS	A)
[3 /1R] [F] [F]	[P] [A] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []
IDENTIFIED THIS SEAL 0032 COUPLI ADDED AS A FAILU FAILURE MODE AND THIS FMEA SHOULD ALSO RECOMMENDS	NASA/RI 3/1R FFP ASSIGNME AS A TWO-SEAL COUPLING RA NG. IOA RECOMMENDS THAT RE MODE ON THIS FMEA/CIL. IS ADDRESSED ON OTHER QD BE 12. THE SSM AGREED W ADDING A STATEMENT TO THE ONS OF ORBITER ENTRY MASS	THER THAN A MULTIPLE "POPPET FAILS OPEN" BE THIS IS A CREDIBLE FMEAS. THE QUANTITY OF ITH THE IOA ISSUE. IOA EFFECTS REGARDING

CONSTRAINTS.

ASSESSME ASSESSME NASA FME	I	D:	RC	1/01/88 RCS-118 03-2F-101091-2					NASA DATA: BASELINE [] NEW [X]						
SUBSYSTEM: MDAC ID: ITEM:				11	FRCS 118 HE PRESS REGULATOR OUTLET TEST PORT COUPLING										
LEAD ANALYST:				c.	C.D. PRUST										
ASSESSMENT:															
CRITICAL				?	R	EDUNI	DANCY	SCRE	ENS	-		CIL ITEM			
FLIGHT HDW/FUN					A		В		С						
NASA IOA	[3 3	/3 /3]]]	[[]	[]		[]	*
COMPARE	Ţ		/]		[]	[]	[]		[]	
RECOMMEN	IDA'	TI	ons	:	(If	dif	ferer	nt fr	om NA	SA)					
	[3	/3]		[]	[]	[]	(Al	[DD/D	ELI]	ETE)
* CIL RE	TE	NT	ION	RAT	ION	ALE:	(If	appl.	icabl		DEGUA	n To	_	,	
											DEQUAT		[]	
INADEQUATE [] REMARKS: IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS TO COUPLE" AND "RESTRICTED FLOW". IOA RECOMMENDS THAT "RESTRICTED FLOW" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON OTHER QD FMEAS. THE SSM AGREED WITH THE IOA ISSUE.															

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-119 03-2F-101095-1		[x]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 119 QUAD CHECK VALVE	ASSEMBLY	
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
CRITICAL FLIGH HDW/FU			CIL ITEM
NASA [3 /3 IOA [2 /1R] [P] [F] [P]	[] *
COMPARE [N /N] [N] [и] [и]	[N]
RECOMMENDATIONS:	(If different i	from NASA)	
[2 /1R] [P] [F] [P] (AD	[A] D/DELETE)
	RATIONALE: (If app	olicable) ADEQUATE INADEQUATE	
REMARKS:	UNT TUTE TOWN AND	FAILURE MODE BE UPG	א השת את א
2/1R AND PLACED CONTAMINATION OF RESULT IN LOSS O	ON THE CIL. WITH UPSTREAM COMPONEN F PROP TANK REPRES	SERIES POPPETS FAIL WITS BY PROP OR PROP SS CAPABILITY AND PROP. THIS COULD LE	ED OPEN, THE VAPORS COULD
VIOLATIONS OF EN	TRY MASS PROPERTIE	S CONSTRAINTS AND L	OSS OF LIFE

DURING FLIGHT.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		NASA DATA: BASELINE [] NEW [X]				
	FRCS 120 QUAD CHECK VALVE	ASSEMBLY				
LEAD ANALYST:	C.D. PRUST		ns e e			
ASSESSMENT:						
CRITICAL: FLIGHT HDW/FUI		CY SCREENS B C	CIL			
NASA [3 /1R IOA [2 /1R] [P] [] [P] [F] [P] F] [P]	[X] * [X]			
COMPARE [N /] [] [] []	[]			
RECOMMENDATIONS:	(If different	from NASA)				
[2 /1R] [P] [F] [P] (AI	[A] DD/DELETE)			
	RATIONALE: (If ap	oplicable) ADEQUATE INADEQUATE				
2/1R. INABILITY INABILITY TO USE	TO REPRESS FRCS OR DEPLETE PROP	FAILURE MODE BE UPO PROP TANK AND SUBSEC COULD RESULT IN VIOL AND LOSS OF LIFE OF	GRADED TO A QUENT LATIONS OF			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-121 03-2F-101091-1	NASA DATA: BASELINE [] NEW [X]							
MDAC ID:	FRCS 121	FRCS							
LEAD ANALYST:	C.D. PRUST								
ASSESSMENT:									
CRITICAL FLIGH HDW/FU		CY SCREENS B C	CIL ITEM						
NASA [3 /1R IOA [2 /1R	[F] [F] [F] [P] NA] [P]	[X] *						
COMPARE [N /] [и][и] []	[]						
RECOMMENDATIONS:	(If different f	from NASA)							
[3 /1R] [F] [F] [P] (AD	[A] DD/DELETE)						
* CIL RETENTION	RATIONALE: (If app	olicable) ADEQUATE INADEQUATE	[] []						
REMARKS:	W101 /DF 0 /45 BBD 1								
IDENTIFIED THIS	NASA/RI 3/IR FFP A AS A TWO-SEAL COUL	ASSIGNMENT. IOA ORI PLING RATHER THAN A	GINALLY MULTIPLE						
SEAL 0032 COUPLI	NG. IOA RECOMMENT	S THAT "POPPET FAIL	S OPEN" BE						
		MEA/CIL. THIS IS A							
		OTHER QD FMEAS. THE AGREED WITH THE IOA							
		TO THE EFFECTS REG							

CONSTRAINTS.

POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES

ASSESSME ASSESSME NASA FME	ENT	I	D:	1/0: RCS- 03-2	L/88 -122 2F-101	.091-	-2	NASA DATA: BASELINE [] NEW [X]						
SUBSYSTEM: MDAC ID: ITEM:				FRC9	FRCS								& B	
LEAD ANALYST:			C.D.	. PRUS	T									
ASSESSME	ENT	:												
		F	LIGH	ITY IT INC	F		IDANCY E			c		CII		
NASA IOA	[3	/3 /3]	[]	[[]	[]		[] *]	
COMPARE	[/]	[]	[] .	[J		[]	
RECOMMEN	IDA!	PI(ons:	(1	f dif	fere	ent fr	om N	ASA)					
	[3	/3]	[]	[]	[]	(AI	[DD/D] ELETE)
* CIL RE		VT.	ION	RATIO	NALE:	(If	appl	icab		ADEQU <i>I</i> ADEQU <i>I</i>		[]	
REMARKS: IOA FAIL COUPLE" FLOW" BE CREDIBLE THE SSM	URI ANI AI	DDI AII	"RES ED A LURE	TRICI S A I MODE	ED FL FAILUR E AND	OW". E MC	IOA DE ON DDRES	REC THI	ommei S FMI	NDS TH	IAT ' THIS	'RES IS	TRICT	Ξì

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-123		NASA DATA: BASELINE [] NEW [X]						
SUBSYSTEM: MDAC ID: ITEM:	FRCS 123 PROPELLANT TANK								
LEAD ANALYST:	C.D. PRUST								
ASSESSMENT:									
CRITICAL		NCY SCREE	NS	CIL ITEM					
FLIGH HDW/FU		В	C ***:						
NASA [1 /1 IOA [1 /1		[]	[]	[X] *					
COMPARE [/] []	[]	[]	[]					
RECOMMENDATIONS:	(If different	from NAS	A)						
[/] []	[]	[] (A)	[DD/DELETE)					
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []									
REMARKS: NO DIFFERENCES. IOA RECOMMENDS THAT THE "D" EFFECTS BE REVISED. FAILURE AFTER ET SEP COULD ALSO RESULT IN LOSS OF LIFE OR VEHICLE. IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE EXPOSURE OF EVA CREW AND GROUND CREW TO PROP OR PROP VAPORS.									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:					1/0 RCS 03-	1/88 -124 2F-10	2108	-1	NASA DATA: BASELINE [] NEW [X]								
SUBSYSTEM:					FRCS 124 PROP LINES, ALL												
ASSESSM	ENT	:															
CRITICALI FLIGHT HDW/FUN				SHT	r				ANCY SCREENS					CIL ITEM			
****								F	_		2						
NASA IOA	[1	/1	L L]	[]]]]]]		[[X X]	*	
COMPARE	ľ		/]	[]	[.]	[3		[]		
RECOMMEN	'DA'	CIC	ONS	: :	(I	f dif	fere	nt fr	om N	IASA)				. =			
	[/	,]]	[]	[J	(A)	[DD/	'DF] ET.F	ETE)	
* CIL RE	ETEN	T]	ION	r Ri	ATIO	NALE:	(If	appl	icab	ıle)		(,			.12,	
REMARKS:							(~FF-		A	DEQU.		[]		
IOA RECO AS A CAU FAILURE SHOULD I CORRESPO	WHI NCL NDI	ON CH UL NG	IS DE R	HOU VAI ETI	LD VE	EA/CI BE AD BODIE ON RA	L. DRES S IN TION	IOA C SED O THE ALE	ONSI N TH ITEM	DERS E FME LIST	THIS A/CII AND	TO E	BE THI	A S	CR FM	EDIBI EA	LE
EFFECTS	DIS	CU	ISS	TH	E P	OSSIB	LE E	XPOSU	RE O	F EVA	AND	GROU	JND	Ĉ	RE	WS TO	,

PROP OR PROP VAPORS.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-125				NA: Bi	SA DATA: ASELINE NEW	[]	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 125 PROP LIN	IES, ALL	ı						
LEAD ANALYST:	C.D. PRU	JST							
ASSESSMENT:							t te i		
CRITICAL	ITY	REDUNDA	NCY	SCREE	NS		CI		
FLIGH HDW/FU	NC	A	В		С	1 <u>23.000</u> 2.2 <u>2.00</u> 3			
NASA [/ IOA [1 /1] []	[]	[[]	[:	X] *
COMPARE [N /N] [.]	[1	[]	[]	N]
RECOMMENDATIONS:	(If d	ifferen	t fro	om NAS	SA)				
ţ, /] []	[]	[] (A	[.DD/	DE] LETE)
* CIL RETENTION	RATIONAL	E: (If	appl	icable	e) Al INAl	DEQUATE DEQUATE	[] 4. 2
REMARKS: NASA/RI DO NOT OBSTRUCTION OR DESTRUCTION OR DESTRUCTION OR DESTRUCTION OF DOCUMENCE IS QUESTREAM FILTERALLURE BE ADDRIVED RECOMMENDATION	DEFORMATI FFECTS, H UESTIONAE ER OR COM ESSED ON	ON (CRI IOWEVER BLE. AN IPONENT. THE FME	THE Y CO IO A/CI	CREDII NTAMII	BILI' NATIONME	TY OF SU ON WOULD	CH FI	AN OW	TO A

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-126	150-1	NASA DATA: BASELINE [] NEW [X]								
MDAC ID:	FRCS 126 PROP FILL	r COUPLING									
LEAD ANALYST:	C.D. PRUST	C.D. PRUST									
ASSESSMENT:											
CRITICAL FLIGH		EDUNDANCY S	CREENS	CIL ITEM							
HDW/FU		В	С								
NASA [2 /1R IOA [2 /1R	[F] [F]] [NA]	[P] [P]	[X] *							
COMPARE [/] [N] [N]	[]	[]							
RECOMMENDATIONS:	(If dif:	ferent from	NASA)								
. [/	J .[] []	[] (1	[ADD/DELETE)							
* CIL RETENTION REMARKS:	RATIONALE:	(If applic	able) ADEQUATE INADEQUATE								
IOA AGREES WITH	NASA/RI FA	ILURE OF A	AND B SCREENS.								

ASSESSME ASSESSME NASA FME	ID):	RCS-127 BASELII						LINE								
MDAC ID:				FRC: 127 PRO		L VEN	r REG	REGULATOR CHECK-OUT					T COUPLING				
LEAD ANA	LYS	T:		C.D	. PRU	ST											
ASSESSME	NT:																
		FI	JIGH	ITY T NC		REDUNI A	DANCY B	SCR	EENS	•		CIL					
	11	אעו	7 10	NC													
NASA IOA	[3	/3 /3]	[]	[]	[]		[] *				
COMPARE	[/]	[]	[]	[]		[1 .				
RECOMMEN	IDAT	'IC	NS:	(If di	ffere	nt fr	om N	(ASA)								
	[3	/3]	[]	[J	[]	(AI	ן מ/מכ] ELETE)				
* CIL RE	TEN	ΙΤΙ	ON	RATI	ONALE	: (If	appl	icab		DEQU	\ጥ ፑ	- F - ·	······································				
				ter us r						DEQUA		į	j				
REMARKS: IOA FAII COUPLE" FLOW" BE CREDIBLE	LURE AND AND	DE	RES	TRIC	TED F	LOW". RE MO	IOA DE ON	REC THI	OULD I	NCLUI	DE "H HAT " THIS	'RES IS	TRICTEI A)			

THE SSM AGREED WITH THE IOA ISSUE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	Dag 100	-3	NASA DA BASELI N					
SUBSYSTEM: MDAC ID:	FRCS 128 PROP CHANNEL							
LEAD ANALYST:	EAD ANALYST: C.D. PRUST							
ASSESSMENT:								
CRITICAL FLIGH	ITY ŘEĎUI	NDANCY SCR	EENS	CIL ITEM				
	NC A	В	С	444				
NASA [1 /1 IOA [1 /1] []	[]		[X] * [X]				
COMPARE [/] []	[]	נ ז	[]				
RECOMMENDATIONS:	(If differe	ent from N	ASA)					
· 1] []	[]	[]	[] (ADD/DELETE)				
* CIL RETENTION	RATIONALE: (I	f applicab	le) ADEQUAT INADEQUAT	E[] E[]				
REMARKS: IOA RECOMMENDS T LIST OR FUNCTION IS COVERED BY TH G" DISCUSSION BE THE SSM AGREED W	AL DESCRIPTION IS FMEA/CIL. REMOVED FROM	N SECTIONS IOA ALSO THE FUNCT	TS BE ITEMI TO SHOW SP RECOMMENDS	ZED IN THE ITEM ECIFICALLY WHAT THAT THE "HIGH				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:			NASA DA' BASELI N	
MDAC ID:	FRCS 129 PROP FEED-OU	T TUBE		
LEAD ANALYST:	C.D. PRUST		_	
ASSESSMENT:				
	TTY REDU	NDANCY SCR	EENS	CIL ITEM
FLIGHT HDW/FU	NC A	В	C	IIEM
NASA [/ IOA [1 /1		[]		[] * [X]
COMPARE [N /N] []	[]	[]	[N]
RECOMMENDATIONS:	(If differ	ent from N	ASA)	
,]	1 [1	[]	[]	[] (ADD/DELETE)
* CIL RETENTION 1	RATIONALE: (I	f applicab	le) ADEQUAT INADEQUAT	E [] E []
REMARKS: NASA/RI DO NOT CO NOW CONSIDERS RES QUESTIONABLE. IO MODE IN THE FMEA, THIS FAILURE MODE	STRICTED FLOW DA DOES NOT R /CIL TO BE AN	IN THIS S EGARD THE OPEN ISSU	(RESTRICTED ECTION OF TO ABSENCE OF	FLOW). IOA UBE TO BE THIS FAILURE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		NASA DATA: BASELINE [] NEW [X]
SUBSYSTEM:	FRCS 130 PROP TK UPPER COMPARTMENT	CHANNEL CHECK-OUT
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
CRITICAL FLIGH	ITY REDUNDANCY SCREENS	CIL ITEM
HDW/FU		C
NASA [3 /1R IOA [2 /1R	[F] [F] [F] [NA] [P] [X] * P] [X]
COMPARE [N /] [N] [N] [] []
RECOMMENDATIONS:	(If different from NASA)	1
[3 /1R	[F] [F] [P] [A] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If applicable)	ADEQUATE [] NADEQUATE []
IDENTIFIED THIS SEAL 0032 COUPLI ADDED AS A FAILU	NASA/RI 3/1R FFP ASSIGNMENT AS A TWO-SEAL COUPLING RATH ING. IOA RECOMMENDS THAT "I IRE MODE ON THIS FMEA/CIL. O IS ADDRESSED ON OTHER QD I	r. IOA ORIGINALLY HER THAN A MULTIPLE- POPPET FAILS OPEN" BE THIS IS A CREDIBLE

WITH THE IOA ISSUE. IOA ALSO RECOMMENDS ADDING STATEMENTS TO THE EFFECTS REGARDING POSSIBLE FIRE HAZARD, HAZARD TO GROUND CREW, AND POSSIBLE VIOLATIONS OF ENTRY MASS PROPERTIES CONSTRAINTS

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-131	1090-2			SA DATA: ASELINE NEW	(x)]]
SUBSYSTEM: MDAC ID: ITEM: COUPLING	FRCS 131 PROP TK	UPPER CO	MPARTMEI	NT CH	ANNEL CH	ECK-(OUT
LEAD ANALYST:	C.D. PRU	ST					
ASSESSMENT:							
CRITICALI FLIGHT HDW/FUN		REDUNDAN A	CY SCREI	ENS C		CIL ITEM	
NASA [3 /3 IOA [3 /3] [] []	[]] *
COMPARE [/] [] [1	[]	[]
RECOMMENDATIONS:	(If di	fferent	from NAS	SA)			
[3 /3] [] [1	C] (AD	[D/DE] LETE)
* CIL RETENTION F	RATIONALE	: (If ap	plicable	AD	EQUATE EQUATE	[]
REMARKS: IOA FAILURE MODES COUPLE" AND "REST FLOW" BE ADDED AS CREDIBLE FAILURE THE SSM AGREED WI	ON ANAI TRICTED F A FAILU MODE AND	LOW". I TRE MODE IS ADDR	OA RECOMON THIS ESSED OF	MEND FMEA	CLUDE "F S THAT " . THIS	RESTI	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-132	02150-1		NASA DATA: BASELINE NEW	: [x]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 132 PROP TK	LOWER CO	OMPARTMENT	CHANNEL B	LEED COUPLING
LEAD ANALYST:	C.D. PRI	UST			
ASSESSMENT:					
CRITICAL FLIGH		REDUNDA	NCY SCREEN	rs	CIL
HDW/FU		A	В .	С	TILL
NASA [2 /1R IOA [2 /1R] [F] P]	[F] [[NA] [P] P]	[X] *
COMPARE [/] [N]	[и]	1	[]
RECOMMENDATIONS:	(If d	ifferent	from NASA	v) .	<u></u>
] []	[] [[] (A	[] DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If a	_	ADEQUATE NADEQUATE	[] [],
REMARKS: IOA AGREES WITH	NASA/RI	FAILURE (OF A AND E	S SCREENS.	

ASSESSME ASSESSME NASA FME	ENT I	D:	RCS-1	33	150-2				NASA DA' BASELI N]	
SUBSYSTE MDAC ID:			FRCS 133 PROP	rk Lo	OWER	COMP	ARTMEI	TV	CHANNEL	BLEED	COUPL	ING
LEAD ANA	LYST	:	c.D. 1	PRUST	r							
ASSESSME	ENT:											
	F	LIGH'					SCREI			CIL ITE	M	
	HD	W/FU	NC	A	•	В			C			
NASA IOA	[3 [3	/3 /3]	[]	[]	[]	[[] *	
COMPARE	[/]	[]	[]	[]	[]	
RECOMMEN	DATI	ons:	(If	dif	feren	t fr	om NAS	SA)				
	[3	/3]	[]	[1	[]	[(ADD/D)		
* CIL RE	TENT	ION I	RÁTION	ALE:	(If	appl	icable					
			4%						ADEQUAT! ADEQUAT!]	
REMARKS: IOA FAII COUPLE" FLOW" BE CREDIBLE THE SSM	LURE AND ADD FAI	"RES' ED A LURE	TRICTEI S A FA: MODE A	D FLO ILURI AND 1	OW". E MOD IS AD	IOA E ON DRES	RECONTHIS	LD MME: FM:	INCLUDE NDS THATEA. TH	"FAILS I "RES! IS IS A	TRICTE A	D

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-134 03-2F-102	2150-1		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM: COUPLING	FRCS 134 PROP TK	LOWER C	COMPARTMEN	IT BULKHEAD	BLEED
LEAD ANALYST:	C.D. PRUS	ST			
ASSESSMENT:					
CRITICAL FLIGH HDW/FU	T		NCY SCREE		CIL
NASA [2 /1R IOA [2 /1R		F] P]	[F] [NA]	[P] [P]	[X] * [X]
COMPARE [/] []	и ј	[N]	[]	[]
RECOMMENDATIONS:	(If di	fferent	from NAS	SA)	
[/] [1	[]	[]	[ADD/DELETE)
* CIL RETENTION	RATIONALE	: (If a	applicable	∍) ADEQUATE INADEQUATE	• •
REMARKS: IOA AGREES WITH	NASA/RI F	AILURE	OF A AND	B SCREENS.	

and the second of the second o

ASSESSMEI ASSESSMEI NASA FME	NT ID:	RCS-135	02150-	2				TA: NE [EW [X]
SUBSYSTEI MDAC ID: ITEM: COUPLING		FRCS 135 PROP TK	LOWER	COMP	ARTME	NT B	ULKHEA	D BLEEI))
LEAD ANA	LYST:	C.D. PRI	JST						
ASSESSMEI	NT:					1			
(CRITICAL FLIGH	ITY r	REDUNI	DANCY	SCRE	ENS	٠	CIL ITE	Æ
		NC	A	В		С		± ± ±.	4
NASA IOA	[3 /3] []	[[]]]	[] *
COMPARE	[/] []	[]	[]	[]
RECOMMENI	DATIONS:	(If d	ifferen	nt fro	om NA	SA)			
	[3 /3] []	[]	[]	[(ADD/DI] ELETE)
* CIL RET	rention 1	RATIONALI	E: (If	appl:	icabl	ΑI	DEQUATI DEQUATI] 3]
IOA FAILU COUPLE" A FLOW" BE	AND "REST ADDED AS	TRICTED I	FLOW". JRE MOI	IOA DE ON	RECO:	MMENI FME	OS THAT	r "RESI IS IS A	RICTED

THE SSM AGREED WITH THE IOA ISSUE.

ASSESSME ASSESSME NASA FME	NT ID:	RCS-	<i>*</i>	1	BASELI N	
SUBSYSTEMDAC ID:	M:	FRCS 136 PROP	TK VENT	AND REGULA	ATOR CHECK-	OUT COUPLING
LEAD ANA	LYST:	C.D.	PRUST			
ASSESSME	NT:					
	CRITICA FLIG		REDUN	DANCY SCRI	EENS	CIL ITEM
	HDW/F		A	В	С	
NASA IOA	• /	R] R]	[F] [P]	[F] [NA]	[P] [P]	[X] *
COMPARE	[/]	[N]	[N]	[]	[]
RECOMMEN	DATIONS	: (I	f differe	nt from N	ASA)	
	[/	1	[]	[]	[]	(ADD/DELETE)
* CIL RE	TENTION	RATIO	NALE: (If	applicab	le) ADEQUAT INADEQUAT	
REMARKS: IOA AGRE	ES WITH	NASA/	RI FAILUR	RE OF A AN	D B SCREENS	s.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-137 03-2F-10)2150-	2			NASA DAT BASELIN NE		;]
SUBSYSTEM: MDAC ID:					TOR	CHECK-O	UT CC	UPLING
LEAD ANALYST:	C.D. PRU	JST						
ASSESSMENT:								
CRITICALI FLIGHT	?	REDUN A	DANCY B	SCRE		2	CIL	
HDW/FUN	iC .	Α	Б		•	• 		
NASA [3 /3 IOA [3 /3] []	[]	[]	[] *
COMPARE [/] []	[]	[1	[]
RECOMMENDATIONS:	(If di	iffere	nt fro	om NA	SA)			
[3 /3] []	[]	[] (.	[ADD/D] ELETE)
* CIL RETENTION F	RATIONALE	: (If	appli	cabl	e)			
		•			7	ADEQUATE ADEQUATE]
REMARKS: IOA FAILURE MODES COUPLE" AND "REST FLOW" BE ADDED AS CREDIBLE FAILURE THE SSM AGREED WI	RICTED I A FAILU MODE ANI	FLOW". JRE MO D IS A	IOA DE ON DDRESS	RECO THIS	MMEI FMI	NDS THAT	"RES S IS	TRICTED A

	ASSESSME ASSESSME NASA FME	NŢ :	ID:	RCS-	1/88 -138 2F-102	106-	1	NASA DATA: BASELINE NEW				[[
	SUBSYSTE MDAC ID: ITEM:			138	FRCS 138 GIMBAL BELLOWS										
LEAD ANALYST: C.D. PRUST															
	ASSESSME	NT:													
			TICAL FLIGH DW/FU	T	R A		DANCY B		REENS C			CII			
	NASA IOA		1 /1 1 /1		[]	[]	[]		K]	[]	*	
	COMPARE	[/]	[]	[]	E]		[]		
	RECOMMEN	DAT	ions:	(:	If dif	fere	nt fr	om N	IASA)						
	-	[/]	[]	[]	[]	(AI	[]\dc		ETE)
	* CIL RE	TEN	TION	RATI	ONALE:	(If	appl	icak	A	DEQUA		[
	REMARKS: IOA RECO "ISOLATI CAUSES O DISCUSS PROP VAP	ON T THE	VALVE HIS F POSS	RELI MEA.	IEF DE IOA	VICE ALSO	FAIL RECO	URE MMEN	TO RE	LIEVI AT TI	E" BI HE EI	E AI	DI CTS	ED A	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-139					ASA DATA BASELINE NEW	[]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 139 GIMBAL B	ELLOWS						
LEAD ANALYST: C.D. PRUST								
ASSESSMENT:								
CRITICAL		REDUND	ANCY	SCRE	ens		CIL	
FLIGH HDW/FU		A	В		С		115	
NASA [/ IOA [1 /1] [] .	[]	[]	[x] *
COMPARE [N /N] []	[]	C]	[N]
RECOMMENDATIONS:	(If di	fferen	t fr	om NAS	SA)			
[/] []	[1	[] (A)	[DD/D1] ELETE)
* CIL RETENTION	RATIONALE	: (If	appl:	icable	AI	EQUATE	[]
REMARKS: NASA/RI DO NOT C NOW CONSIDERS TH BE QUESTIONABLE. MODE IN THE FMEA BUT DOES RECOMME	E CREDIBI IOA DOE: /CIL TO B	LITY O S NOT : E AN O	F RES REGAI PEN	STRIC' RD THI ISSUE	RESTR FED E E ABS	RICTED F	A BE	LLOWS TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		CS-140 BASELINE []							
SUBSYSTEM: MDAC ID: ITEM:	FRCS 140 PRESSURE	E RELIEF	' ASSEMBL	Y					
LEAD ANALYST:	C.D. PRU	JST							
ASSESSMENT:									
CRITICAL FLIGH	ITY T	REDUNDA	NCY SCRE	ENŚ	CIL ITEM				
	NC .	A	В	С					
NASA [/ IOA [2 /1R] [p]	[NA]	[[x] *				
COMPARE [N /N] [N]	[и]	[N]	[N]				
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)					
[2 /1R] [P]	[F]		[A] DD/DELETE)				
* CIL RETENTION	RATIONALI	E: (If a	applicabl	e) ADEQUATE INADEQUATE	[]				
REMARKS: NASA/RI DO NOT C LEAKAGE). IOA C RECOMMENDS IT BE THE BURST DISK I IOA ISSUE.	ONSIDERS	THIS F <i>I</i> 0 03-2F-	AILURE MO -101060-5	DE TO BE CRE	DIBLE AND RE HISTORY OF				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:			NASA DATA: BASELINE NEW	
MDAC ID:	FRCS 140 PRESSURE RELIE	ASSEMBLY		
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICALI FLIGHT	TY REDUNDA	ANCY SCREENS	5	CIL ITEM
HDW/FUN		В	C	1154
NASA [2 /1R IOA [2 /1R] [P]	[F] [[NA] [P] P]	[X] * [X]
COMPARE [/] []	[N] [1	[]
RECOMMENDATIONS:	(If different	: from NASA)	ı	
[/] []	[] [] (AI	[] DD/DELETE)
* CIL RETENTION F	RATIONALE: (If a		ADEQUATE NADEQUATE	
REMARKS: IOA AGREES WITH MADDITION OF STATE VIOLATIONS OF ORE HAZARD TO GROUND VAPORS.	EMENTS TO THE ENSITER ENTRY MASS	OF B SCREEN FECTS REGAR PROPERTIES	I. IOA REC RDING POSSI CONSTRAIN	COMMENDS THE IBLE ITS, AND

ASSESSMENT ID:	1/01/88 RCS-141 03-2F-10	1060-3		[X]	
MDAC ID:	FRCS 141 PRESSURE	RELIEF A	ASSEMBLY			
LEAD ANALYST:	C.D. PRU	ST				
ASSESSMENT:						
CRITICAL: FLIGH		REDUNDANC	CY SCREENS	1	CIL	[
HDW/FUI		A	В	С		
NASA [3 /1R IOA [1 /1] [F] [NA] [P]	[X] *
COMPARE [N /N] [и] [N.] [N]	[]
RECOMMENDATIONS:	(If di	fferent i	from NASA)			- 1-
[/] [] [] [] (AI	[DD/DE] :LETE)
* CIL RETENTION	RATIONALE	: (If app	plicable)	ADEQUATE	г	1
DEWA DVC .	-		IN	IADEQUATE	[i
REMARKS: IOA AGREES WITH CONSIDERED RELIE ANALYSIS.	NASA/RI R F VALVE T	RATIONALE TO BE AN 1	FOR 3/1R EMERGENCY	FNP ASSIGN	MENT THE	. IOA ORIGINAI

ASSESSMEN ASSESSMEN NASA FME			1/01/88 RCS-141A 03-2F-101060-4						NASA DATA: BASELINE [] NEW [X]					
SUBSYSTEM MDAC ID: ITEM:			FRCS 141 PRESSU	JRE	RELI	EF 2	ASS	EMBLY						
LEAD ANA	LYST	:	C.D. I	PRUS	ST									
ASSESSME	NT:													
Ó	CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C													
				F	A		В			С				
NASA IOA	[3	/1R /1]]	[]	P]].	NA]	[P]	[x]	*
COMPARE	[N	/N]	[]	1]	[N]	[и]	[N]	
RECOMMEN	DATI	ons:	(If	dif	fere	nt i	fro	m NAS	A)					
	[/]	[]	[]	[] (] ADD/	DE] LE	TE)
	CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []													
REMARKS: IOA AGREI CONSIDERI ANALYSIS	E TO	ATION D BE	ALE AN I	FO	R 3/1 RGENC	R	PNP ASSI SYSTEM I	GNME N TH	ENT IE	OR	IOA IGINAL			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-142 03-2F-10	1091-1	NA B	SA DATA: ASELINE [] NEW [X]							
SUBSYSTEM: MDAC ID:	FRCS 142		PORT COUPL	ING							
LEAD ANALYST:	C.D. PRU	ST									
ASSESSMENT:											
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM											
		A :	в с								
NASA [3 /1R IOA [3 /1R] []	F] []	F] [P NA] [P] [X] *] []							
COMPARE [/] []	и] [и	и] [] [и]							
RECOMMENDATIONS:	(If di	fferent f	rom NASA)								
[3 /1R] [:	F] [F] [P	[A] (ADD/DELETE)							
* CIL RETENTION	RATIONALE			EQUATE [] EQUATE []							
INADEQUATE [] REMARKS: IOA AGREES WITH NASA/RI FAILURE OF A AND B SCREENS. IOA RECOMMENDS THAT "POPPET FAILS OPEN" BE ADDED AS A FAILURE MODE ON THIS FMEA/CIL. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON OTHER QD FMEAS. THE QUANTITY ON THIS FMEA/CIL SHOULD BE 12. THE SSM AGREED WITH THE IOA ISSUE. IOA RECOMMENDS ADDING A											

ENTRY MASS PROPERTIES CONSTRAINTS.

STATEMENT TO THE EFFECTS REGARDING POSSIBLE VIOLATIONS OF ORBITER

ASSESSME ASSESSME NASA FME	\mathbf{NT}	II	D:	1/01/88 NASA DATA: RCS-143 BASELINE [03-2F-101091-2 NEW [[-		
SUBSYSTEMDAC ID:	М:			FRC 143 REI	;	ALVE	TEST 1	POR!	r cou	JPLING				
LEAD ANA	LYS	ST:	:	C.D	. PRU	IST								
ASSESSME	SSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM														
	I		/FU			A	В			С			***	
NASA IOA	[3	/3 /3]	[]	ָר נ]	[]		[]	*
COMPARE	[/]	(]	[]	[]		[]	
RECOMMEN	DA7	CIC	ons:	(If di	ffere	ent fr	om 1	NASA)					
	[3	/3]	ſ]	(].	[]	(A)	[DD/I)ELI	ETE)
* CIL RE	TEI	(T	ION	RATI	ONALE	E: (I1	f appl	ical		ADEQU		[]	
REMARKS:	INADEQUATE []													
IOA FAIL	URI	E N	MODE	s on	ANAI	LYSIS	SHEET	SHO	OULD	INCLU	DE "	FAII	s 1	О
COUPLE"										ENDS T				CTED
FLOW" BE											THIS			
CREDIBLE	REDIBLE FAILURE MODE AND IS ADDRESSED ON OTHER QD FMEAS.													

THE SSM AGREED WITH THE IOA ISSUE.

ASSESSME ASSESSME NASA FME	NT	ID):	RCS		050-	-1	N	NASA DATA: BASELINE [] NEW [X]					
SUBSYSTE MDAC ID: ITEM:				FRC 144 GRO		(AUP	L ISO	LATIO	N VAI	VE				
LEAD ANA	LYS	ST:		C.D	PRUS	Г								
ASSESSME	NT	:												
	CRITICALITY REDUNDANCY SCREENS CIL ITEM													
	I			NC	· A			В	C	С			<u>LM</u>	
NASA IQA	[3	/3 /3]	[]	[]	[]		[]	*
COMPARE	[/]	[]	[]	[]		[]	
RECOMMEN	IDA!	ric	ons:	((If dif:	fer	ent f	rom N	IASA)					
	. [/]	[]	[]	[]	(Al	[DD/1	DELI	ETE :
* CIL RE		T		RATI		(I	f app	licab	1	ADEQUA ADEQUA]	•
NO DIFFI	ERE	NCI	ES.											

ASSESSM ASSESSM NASA FM	ENT ENT EA	Di II	ATE D:	: 1/ RC 03	1/01/88 RCS-145 03-2F-101050-1					NASA DATA: BASELINE [] NEW [X]					
SUBSYST MDAC ID ITEM:				14	5) MA	NUAL	ISOL	SOLATION VALVE						
LEAD AN	ALYS	ST	:	c.	D. F	PRUS	T								
ASSESSM	ENT:	:													
	CRI		ICA: LIG			R	EDUN			REENS			CIL		
	I	HDI	W/F	UNC		A		В	i	C					•
NASA IOA]	3 1	/3 /1]		[]	[]]]		[x]	*
COMPARE	[N	/N]		[]	[]	[]		[И]	
RECOMME	NDAT	ri(ons	:	(If	dif	fere	nt fr	om 1	NASA)	•				
	[/]		[]	[]	[]	(AI	[DD/D:		ETE)
* CIL R	ETEI	T.	ION	RAT	IONA	LE:	(If	appl	ical	ole)			•		
												ATE ATE]	
REMARKS		- Ta 1	n			i n	mo		0 DI	737.01	T	MOM C	10MC	TNI	
IOA 1/1 CREDIBI	DAS LITY	2 C	OF '	rhis	FAI	LUR	E MOI	DE TO	BE	OUEST	IONA	BLE.	IO.		DOES
NOT REG.	ARD	T	HE Z	ABSE	NCE	OF	"FAI	LURE	TO I	REMAIN	OPE	N" IN	TH:	E	
FMEA/CI FAILURE								BUT D	OES	RECOM	MEND	THAT	TH	IS	
LYTHOKE	TAOI	بتدر	Dr	AUU	(T)	• باندا					•				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:				NASA DATA BASELINE NEW								
MDAC ID:	FRCS 146 GROUND MA	NUAL ISOI	V NOITA	ALVE								
LEAD ANALYST:	C.D. PRUS	Т										
ASSESSMENT:												
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM												
HDW/FU		E	3	С	1 1 EM							
NASA [/ IOA [1 /1] [] [] []	[] * [X]							
COMPARE [N /N] [] [] [1	[N]							
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)	The second secon							
[1 /1] [] [] [(A	[A] DD/DELETE)							
* CIL RETENTION	RATIONALE:	(If appl	icable)									
	ADEQUATE [] INADEQUATE []											
RUPTURE, EXTERNA SHOULD BE ADDED	REMARKS: NASA/RI DO NOT COVER THIS FAILURE MODE (STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE). THE SSM AGREED THAT THIS VALVE BODY SHOULD BE ADDED TO THE HELIUM LINE EXTERNAL LEAKAGE FMEA/CIL (03 2F-101013-1) WITH CORRESPONDING RETENTION RATIONALE.											

IOA ALSO RECOMMENDS THAT THIS FMEA INCLUDE PROP LEAKAGE EFFECTS (CORROSION, FIRE, EXPLOSION, EXPOSURE OF EVA AND GROUND CREWS).

ASSESSM ASSESSM NASA FM	ENT ENT EA	D. I: #:	ATE:	1/0 RCS 03-	-, · -, · ·						NASA DATA: BASELINE [] NEW [X]				
SUBSYST MDAC ID ITEM:	EM:			FRC 147											
LEAD AN	ALY	ST	:	C.D	. PRUS	T									
ASSESSM	ENT	:													
	CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM														
]				A	•	В		c	:			. ISP		
NASA IOA	[1	/1 /1]	[]	[]	[]		[X X]	*
COMPARE	[/]	[]	[]	[]		[]	
RECOMME	NDA'	ri(ONS:	: (If dif	fere	nt fr	om N	(ASA)						
	[1	/1]	[]	[. 1	[]		[\do			TE)
* CIL R	ETE	NT	ION	RATI	ONALE:	(If	appl	icab	A		ATE]	
REMARKS										~		•		•	
THIS FM															
	OP TANK ISOL VALVES. IOA HAS NO ISSUE WITH THIS FAILURE MODE, WEVER DOES RECOMMEND THAT THE EFFECTS INCLUDE THE POSSIBLE														
EXPOSUR	E O	F	EVA	AND	GROUND	CRE	WS TO	PRO	P OR	PROP	VAPO	ORS	<u>.</u> .	21 €	21.1
NASA/RI	DO	N	OT (COVER	STRUC	TURA	L FAI	LURE	, RUI	TURE	, OR	EX	TE	RN	AL
LEAKAGE	OF	T	HE 1	/ALVE	HOUSI	NG O	N THI	s FM	EA OF	₹ ELS	EWHE	₹E.		TH]	E SSM

RETENTION RATIONALE.

AGREED THAT THIS VALVE BODY SHOULD BE ADDED TO THE PROP LINE EXTERNAL LEAKAGE FMEA (03-2F-102108-1) WITH CORRESPONDING

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		NASA DATA: BASELINE [] NEW [X]									
MDAC ID:	FRCS 148 PROP TK ISOL VLVS 1/2 & 3/	4/5									
LEAD ANALYST:	C.D. PRUST										
ASSESSMENT:											
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C											
NASA [3 /1R IOA [1 /1] [P] [P] [P] [] * [X]									
COMPARE [N /N] [N] [N] [n] [n]									
RECOMMENDATIONS:	(If different from NASA)										
[2 /1R] [P] [P] [F] [A] (ADD/DELETE)									
1.7 26.2	RATIONALE: (If applicable)	ADEQUATE []									
FLOW TO A THRUST WITHDRAWS 1/1 AB CAPABILITY DURING (BASED ON A POSS IN THE FUTURE. IOA RECOMMENDS TO A 2/1R PPF AN FRCS PROP COULD VIOLATIONS OF EN	INADEQUATE [] REMARKS: IOA WITHDRAWS 1/1 CRIT, BUT MAINTAINS CONCERN THAT RESTRICTED FLOW TO A THRUSTER COULD RESULT IN BURN-THROUGH. IOA ALSO WITHDRAWS 1/1 ABORT ISSUE DUE TO LACK OF CURRENT FRCS DUMP CAPABILITY DURING RTLS & TAL, HOWEVER RECOMMENDS A 1/1 ABORT CRIT (BASED ON A POSSIBLE INCOMPLETE DUMP) IF SUCH A CAPABILITY EXISTS										

ASSESSMEN ASSESSMEN NASA FME	*m T	n .	1/01/8 RCS-14 03-2F-	_	20-2			NASA BASE	DATA: LINE NEW	[]
SUBSYSTEM MDAC ID: ITEM:	1 :		FRCS 149 PROP T	rk is	OL VI	V 1/	′2				
LEAD ANAI	LYST	:	C.D. I	RUSI	:						
ASSESSMEN	T:										
C	F	ICAL	C		DUNDA		SCREE			CIL ITE	м
	HD	W/FUI	1C	A		В		С			
NASA IOA	[3	/1R /3]	[P]	[NA	\]	[P] []		[] *
COMPARE	[/N]	[1]	[и]	[и]		[]
RECOMMENI	OATI	ons:	(If	diff	erent	fro	om NAS	A)			
	[/]	[]	[]	[]	(AD	[D/D] ELETE)
* CIL RET	PENT:	ION I	RATIONA	LE:	(If a	ppli		ADEQU INADEQU]
REMARKS:	es W	ו אידי	JASA/RI	RAT	TANAT	E FC			•		r.

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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-149	CS-149A BASELINE []							
	FRCS 149 PROP TK	ISOL VI	W 1/	2					
LEAD ANALYST:	C.D. PR	UST		-					
ASSESSMENT:									
CRITICAL FLIGH		REDUNDA	ANCY	SCREEN	NS		CIL		
	NC	A	В		С			•	
NASA [/ IOA [3 /3] []]	[]	[]	[] *]	
COMPARE [N /N] []	[]	[]	[]	
RECOMMENDATIONS:	(If d	ifferent	fro	m NAS	A)				
[3 /1R		P]	[NA	\]	[P] (A	[DD/D:] ELETE)	
* CIL RETENTION	RATIONAL	E: (If a	appli		AΓ	DEQUATE DEQUATE	[]	
REMARKS: NASA/RI DO NOT COVER THIS FAILURE MODE (INTERNAL LEAKAGE). IOA NOW CLASSIFIES THIS FAILURE AS A 3/1R PNP. IOA RECOMMENDS THAT THIS FAILURE MODE BE ADDED TO 03-2F-102120-2 (3/1R PNP). THIS IS A CREDIBLE FAILURE MODE WHICH SHOULD BE ADDRESSED.									

ASSESSMI ASSESSMI NASA FMI	ENT ENT EA	DZ II #:	ATE: D:	1/01/8 RCS-15 03-2F-	38 50 -1	021	L20 - 1			•		NZ	ASA DATA: BASELINE NEW] K]]		
SUBSYSTIMDAC ID				FRCS 150 PROP	rĸ	IS	SOL V	ΓΛ	1,	/2							
LEAD AND			:	C.D. 1	PRI	JSI	ŗ										
ASSESSMI	ENT	:															
		F	LIGH:					ANG			REEN			CIL			
]	HDI	W/FU	NC		A			В			C					
NASA IOA]	3 2	/1R /1R]	[P P]	[P P]	[P P]	[[x]	* .	
COMPARE	[N	/]	[1	[]	(]	[N	[]		
RECOMME	NDA'	TI	ons:	(If	d :	iff	feren	t i	fro	om	NASA)					
-	[2	/1R]	[P]	[P	1	[P] (AI	A D/DC		ETE)	
* CIL R	ETE	NT:	ION I	RATIONA	ΔL	E:	(If	apı	oli	ica	ble)						
-			- .				•	••	•			Al	DEQUATE DEQUATE]		
CAPABIL	HDR. ITY ON	DI PO:	URIN SSIB:	G RTLS LE INAI	& OE(TT AUÇ	AL, HO	OWI UMU	EVI P)	ER IF	RECO	MMI	CURRENT ENDS A 1/ A CAPABII	/1 A	BO	RT C	RIT
FAILURE	MMC OM	ENI DE	DS TI	HAT THI UPGRADI	E I Ed	FA] TC	LED (CL(R 1	OSI PPI	ED PA	AND P	LA	ILS TO RECED ON THE	HE C	IL	•	
TO PERF	ORM	E	T SE	P, OR T	JI	ÖL	TION	s (ЭF	EN	TRY	MAS	SS PROPER	RTY	AD	* *** T	I

ASSESSMENT DAT ASSESSMENT ID: NASA FMEA #:	RCS-1		-2	NASA DA' BASELI N		
SUBSYSTEM: MDAC ID: ITEM:	FRCS 151 PROP	TK ISOL	VLV 3/4/5			
LEAD ANALYST:	C.D.	PRUST				
ASSESSMENT:						
	CALITY GHT	REDUN	IDANCY SCR	EENS	CIL	
	FUNC	A	В	С	110	
NASA [3 /	'1R] '3]	[P] []	[NA] []	[P] []	[[] *
COMPARE [/	מ' [[N]	[14]	[и]	[]
RECOMMENDATION	is: (I:	f differe	ent from N	(ASA)		
] ' [/	']	[]	[]	[]	(ADD/D] ELETE)
* CIL RETENTION	N RATIO	NALE: (If	f applicab	ole) ADEQUAT INADEQUAT	-]
REMARKS:	H NASA/1	RI RATION	NALE FOR 3	/1R PNP ASS	IGNMEN	IT.

ASSESSMEN ASSESSMEN NASA FMEA	II TI):	RCS-1					ı	NASA DAT BASELIN NE]
SUBSYSTEM MDAC ID: ITEM:			FRCS 151 PROP	rk is	SOL V	/LV 3	/4/5				
LEAD ANAI	YST:	;	c.D. 1	PRUS	r						
ASSESSMEN	IT:										
c			ITY	RI	EDUNE	DANCY	SCR	EENS		CIL	
		JIGH /FUI	NC I	A		В	i	C		ITE	AT
NASA IOA COMPARE	[3	/ /3]	[]	[]	[]	[] *
COMPARE	[N	/N]	[]	[]	[3	[]
RECOMMEND)ATIC	ns:	(If	dif	feren	nt fr	om N	ASA)			
	[3	/1R]	[P]	[N	A]	[]	P] ([ADD/DI	
* CIL RET	'ENTI	ON I	RATION	ALE:	(If	appl	icab	7	ADEQUATE	[]
REMARKS: NASA/RI D NOW CLASS	O NO	OT CO	OVER THE	HIS I	FAILU E AS	JRE M A 3/	ODE 1R P	(INTE	RNAL LE	AKAGE) OMMENI). IOA OS THAT

THIS FAILURE MODE BE ADDED TO 03-2F-102120-2 (3/1R PNP). THIS IS A CREDIBLE FAILURE MODE WHICH SHOULD BE ADDRESSED.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-152 03-2F-10		NASA DATA: BASELINE NEW		
MDAC ID:	FRCS 152 PROP TK				
LEAD ANALYST:	C.D. PRU	JST			
ASSESSMENT:					
CRITICAL FLIGH	ITY T	REDUNDAN	CY SCREE	NS	CIL ITEM
	NC	A	В	С	-
NASA [3 /1R IOA [2 /1R] [P] [P] [P] P]	[P] [P]	[x] *
COMPARE [N /] [] []	[]	[N]
RECOMMENDATIONS:	(If di	ifferent	from NAS	A)	
[2 /1R	1 [P] [Pj	[P] (Al	[A] DD/DELETE)
* CIL RETENTION	RATIONALI	E: (If ap	_) ADEQUATE INADEQUATE	[]
REMARKS: IOA WITHDRAWS 1/ CAPABILITY DURIN (BASED ON POSSIE IN THE FUTURE. IOA RECOMMENDS T FAILURE MODE BE INABILITY TO USE	G RTLS & LE INADECT THE IUPGRADED	TAL, HOW QUATE DUM FAILED CI TO 2/1R	TO LACK EVER RECO P) IF SUCO OSED AND PPP AND	OF CURRENT OMMENDS A 1, CH A CAPABIL FAILS TO RI PLACED ON TI	FRCS DUMP /1 ABORT CRIT LITY EXISTS EMAIN OPEN HE CIL.
TO PERFORM ET SE	P, OR VIC	CIATIONS	OF ENTRY	MASS PROPE	

ASSESSMEN ASSESSMEN NASA FMEA	TO TE	١.	DCC-1F	: 2	50-1				NASA DATA BASELINE NEW]
SUBSYSTEM MDAC ID:			FRCS 153 MANIFO)LD 1	./2 F	ILL &	DRAI	N/	PURGE COU	PLIN	G
LEAD ANA	LYST:	:	C.D. I	PRUST	?						
ASSESSME	NT:										
		[CAL]	TY T	RI	DUND	ANCY	SCREE	ENS		CIL	
	HDV	/FUN	1C	A		В			С		
NASA IOA	[2 [2	/1R /1R]	[F]	[F [NA]	[P] P]	x] x]] *].
COMPARE	[/]	[N]	[N]	[]	נ `]
RECOMMENI	DATIC	ns:	(If	diff	eren	t fro	m NAS	SA)			
	[/	1	[]	[]	[] (A	[.DD/D] ELETE)
* CIL RET	renti	ON I	RATIONA	LE:	(If a	appli	cable		ADEQUATE ADEQUATE		
REMARKS:	ee 1811	ריינים א	מאל עם או	ר גם	יו ווסד	OF A	AND	R	SCDFFNS		

ASSESSME NASA FME	NT	II	D:	RCS	5 - 154	Ļ	.50-2				BASELI N	NE	[x]	
SUBSYSTE MDAC ID: ITEM:				FRO 154 MAI	54 ANIFOLD 1/2 FILL & DRAIN/PURGE CO									;	
LEAD ANA	LYS	ST	:	c.	D. PF	RUSI	1								
ASSESSME	NT	:													
	CR:		ICAL LIGH			RE	DUND	ANCY	SCREI	ENS			CIL ITEM	Ī	
	1	HDI	W/FU	NC		A	•	В		С					
NASA IOA	[[3	/3 /3]		[]	[]	[]		[]	*
COMPARE	[/]	i	[]	[]	[]		[]	
RECOMMEN	DA'	rI(ons:		(If d	liff	eren	t fr	om NAS	SA)					-
	[3	/3		!	[]	[1	[]	(AD	[D/DE] ELE	TE)
* CIL RE		NT:	ION	RAT	IONAI	LE:	(If	appl:	icable	A.	DEQUAT DEQUAT]	
REMARKS: IOA FAII COUPLE" FLOW" BE CREDIBLE THE SSM	UR AN A	D DD: AI:	"RES ED A LURE	TRI S A MO	CTED FAII DE AI	FLO LURE ND]	W". E MOD ES AD	IOA E ON DRES	RECOI THIS	MMENI FME	DS THA	AT " HIS	REST	rri Y	O CTED

	SMENT DATE: 1/01/88 SMENT ID: RCS-155 FMEA #: 03-2F-102150-1						L	NASA DATA: BASELINE [] NEW [X]								
SUBSYSTEM MDAC ID:	M:		FRCS 155 MANIF	'OLI) 3	1/4/5	5 F:	ILI	. & I	ORA]	N/P	URGE	COU	PLI	ENC	3
LEAD ANAI	LYST	' :	C.D.	PRU	JSI	?										
ASSESSME	T:															
C		'ICAL	ITY r		RE	DUNI	OAN	CY	SCRI	EENS	5			IL TEN	4	
	_		AC		A			В			С				_	
NASA IOA		/1R /1R]	F P]	[F NA]]	P] P]		[X X]	*
COMPARE	[/]	[N]	[N]	[]		[]	
RECOMMENI	DATI	ons:	(If	d:	iff	erer	nt :	fro	m N2	ASA)						
	[/]	[]	[]	Ĺ	j	(2	[ADD,	/DI] ELE	ETE)
* CIL RET	rent	'ION I	RATION	ALI	€:	(If	apı	pli	.cab]	•		QUATE QUATE	_]	
REMARKS:	ES W	ITH I	NASA/F	I	FAI	LURI	E 01	e A	ANI) В	SCR	EENS.				

ASSESSMI ASSESSMI NASA FMI	ENT	II):	RCS	15	6	.50-2	NASA DATA: BASELINE [] NEW [X]							
SUBSYSTIMDAC ID				FRO 156 MAN	5	LD 3	/4/5	FILI	L & DF	RAIN,	PURGE	CO	UPLI	NG	i r
LEAD AN	ALYS	5 T :	:	C.I). P	RUSI	?								
ASSESSM	ENT	:													
	CR		ICAL LIGH			RE	DUND	ANCY	SCREE	ENS			CIL	ſ	
	1		V/FU			A		В		С				•	
NASA IOA]	3	/3 /3]		[[]	[]	[]		[]	*
COMPARE	[/]		[1	[]	[]		[]	
RECOMME	NDA:	ri	ons:		(If	difí	eren	t fro	om NAS	SA)					
	, . [3	/3]		[]	[]	[]	(AI	[DD/DE		TE)
* CIL R		NT:	ION	RAT:	IONA	LE:	(If	appli	icable	A)	DEQUAT DEQUAT		[]	
REMARKS IOA FAI COUPLE" FLOW" B CREDIBL THE SSM	LURI ANI E AI E F	D DD: AI:	"RES ED A LURE	TRIO	CTED FAI DE A	FLO LURI ND	OW". E MOD IS AD	IOA E ON DRESS	RECONTHIS	MENI FME	DS THA A. TH	T '	REST	RI Y	O CTED

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-157 03-2F-1023	L/01/88 NASA DATA RCS-157 BASELINE 03-2F-102110-2 NEW						
MDAC ID:	157							
LEAD ANALYST:	C.D. PRUST	<u> </u>						
ASSESSMENT:								
FLIGHT	ITY RI I NC A		CY SCREE	c	CIL	Į.		
•					-			
NASA [3 /1R IOA [3 /3] [] [NA]	[]	[] *		
COMPARE [/N] . [N] [и ј	[N]	[]		
RECOMMENDATIONS:	(If diff	ferent :	from NAS	A)				
[/] [] [1	[] (A	[DD/DE] LETE)		
* CIL RETENTION I	RATIONALE:	(If app	olicable	·)				
				ADEQUATE INADEQUATE	[[]		
REMARKS: IOA AGREES WITH N RECOMMENDS THAT T EFFECTS (CORROSIO	THE EFFECTS	ON THE	IS FMEA	INCLUDE PRO	P LEA	KAGE		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-158	NASA DATA: BASELINE [] NEW [X]
	FRCS 158 MANIFOLD 1, ISOL VLV	
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
FI.TGH		C CIL TEM
	[P] [P] [E] [P]	P] [] * P]
COMPARE [N /] [] [] [] [N]
RECOMMENDATIONS:	(If different from NASA)	.
[2 /1R		P] [A] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If applicable)	ADEQUATE [] NADEQUATE []
CAPABILITY DURIN (BASED ON POSSIE IN THE FUTURE. IOA RECOMMENDS T FAILURE MODES BE CERTAIN COMBINAT SIDE) COULD RESU VIOLATIONS OF EN	A ABORT ISSUE BASED ON LACE IG RTLS & TAL, HOWEVER RECONSIDE INADEQUATE DUMP) IF SUCH THAT THE FAILED CLOSED AND ISSUED OF TWO FAILURES (LOSSULT IN INABILITY TO DUMP FROM THE TOTAL TOTAL TO THE TALL TO THE TALL TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL THE TALL TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL THE TALL TOTAL	OF CURRENT FRCS DUMP MENDS A 1/1 ABORT CRIT H A CAPABILITY EXISTS FAILS TO REMAIN OPEN PLACED ON THE CIL. OF YAW JETS ON SAME CS PROP AND POSSIBLE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-159 03-2F-101080-1	DATA: LINE [] NEW [X]	
SUBSYSTEM: MDAC ID:	FRCS 159	OUND PURGE/DRAIN C	COUPLING
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:	•		
FLIGH'	ITY REDUNDA I NC A	ANCY SCREENS B C	CIL ITEM
NASA [2 /1R IOA [2 /1R] [F]	[F] [P] [NA]	[X] * [X]
COMPARE [/] [N]	[N] []	. []
RECOMMENDATIONS:	(If different	from NASA)	
. [2 /1R] [F]	[F] [P]	[A] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If a	ADEOUA	ATE [] ATE []
IOA RECOMMENDS T MODE ON THIS FME ADDRESSED ON OTH ISSUE. IOA ALSO	HAT "POPPET FAII A/CIL. THIS IS ER QD FMEAS. TH RECOMMENDS ADDI GE EFFECTS (CORF	LE FOR FAILURE OF LS OPEN" BE ADDED A CREDIBLE FAILUR HE SSM AGREED WITH ING A STATEMENT TO ROSION, FIRE, EXPI	AS A FAILURE RE MODE AND IS H THE IOA D THE EFFECTS

ASSESSME	ESSMENT DATE: 1/01/88 NASA DATA: ESSMENT ID: RCS-160 BASELINE [] EA FMEA #: 03-2F-101080-2 NEW [X]												
SUBSYSTEM MDAC ID:				FRO 160 MAI	0	0 1,	GROUND	PU	RGE/DR#	AIN COU	PLING	;	
LEAD ANA	LYS	T:		C.1	D. PRI	JST							
ASSESSME	NT:	:											
•	CRI		CAL LIGH			REDU	NDANCY	sc	REENS		CII		
				A	В		С			11011			
NASA IOA	[[3 3	/3 /3]	[]	[[]	[]]]	*
COMPARE	[/]	Ĺ]	[]	[]	[]	
RECOMMEN	ľAG	CIC	ons:		(If d	iffer	ent fr	om	NASA)				
	[3	/3]	[]	[]	(] ([ADD/I		ETE)
* CIL RE	TEN	1T.I	ON	RAT	IONAL	E: (I	f appl	ica		DEQUATE	: Г	1	
										DEQUATE]	
REMARKS: IOA FAIL COUPLE" FLOW" BE CREDIBLE	ANI AI	DDE	'RES	TRI S A	CTED : FAIL	FLOW"	. IOA IODE ON	RE TH	COMMENI	OS THAT A. THI	"RES	TRI A	ro ICTED

THE SSM AGREED WITH THE IOA ISSUE.

ASSESSME ASSESSME NASA FME						2110-	-2		ŀ		DATA ELINE NEW	[] · ·	
SUBSYSTE MDAC ID: ITEM:				161		2,]	ISOL V	LV						
LEAD ANA	LYS	T:		C.D.	PRU	ST								
ASSESSME	NT:													
	CRI				1	REDUN	NDANCY	SCF	REENS			CII		
FLIGHT HDW/FUNC					;	A	В	}	C	2				
NASA IOA	[3 3	/1R /3]	[]	P]	[N	A]	[]	?]		[] *	
COMPARE	[/N]	[]	и ј	[N]	[]	1]		[]	
RECOMMEN	DAT	'IO	ns:	(1	f di	ffere	ent fr	om N	IASA)					
	[/	1	[]	C]	נ]	(A] DELETE)	
* CIL RE		TI	ON 1	RATIC	NALE	: (I1	fappl	icak	7	ADEQU ADEQU	JATE JATE	[]	
REMARKS: IOA AGRE		WI	TH I	NASA/	RI R	ATION	NALE F	OR 3	/1R E	NP A	ASSIG	NME	NT.	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	TA: NE[] CW[X]		
SUBSYSTEM: MDAC ID: ITEM:	FRCS 162 MANIFOLD 2, ISOL	VLV	
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
FLIGH			CIL ITEM
HDW/FU	NC A	ВС	
NASA [3 /1R IOA [2 /1R] [P] [P] [P] P] [P]	[] * [X]
COMPARE [N /] [.] [] []	[и]
RECOMMENDATIONS:	(If different	from NASA)	
[2 /1R	[P] [P] [P]	[A] (ADD/DELETE)
* CTI. RETENTION	RATIONALE: (If ap)	plicable)	
	(11 dF)	ADEQUATI INADEQUATI	E [] E []
CAPABILITY DURIN (BASED ON POSSIB	1 ABORT ISSUE BAS G RTLS & TAL, HOW LE INADEQUATE DUM	EVER RECOMMENDS A	1/1 ABORT CRIT
FAILURE MODES BE CERTAIN COMBINAT SIDE) COULD RESU	THAT THE FAILED CLASSIFIED CLASSIFIED TO 2/1R PIONS OF TWO FAILURED TO THE PROPERTY TO THE PRO	PPP AND PLACED OF RES (LOSS OF YAW S O DUMP FRCS PROP A	N THE CIL. JETS ON SAME AND POSSIBLE
	TRY MASS PROPERTION IN THE PROPERTY.	ES CONSTRAINTS LEA	ADING TO LOSS

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-163 03-2F-101080-1	NAS BA	SA DATA: SELINE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 163 MANIFOLD 2, GRO	OUND PURGE/DRAI	N COUPLING
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
FLIGH'	ITY REDUNDA I NC A	ANCY SCREENS B C	
NASA [2 /1R IOA [2 /1R] [F]] [P]	[F] [P] [NA]	[X] * [X]
COMPARE [/] [N]	[и] [ј	[]
RECOMMENDATIONS:	(If different	: from NASA)	
[2 /1R] [F]	[F] [P]	[A] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If a		QUATE []
IOA RECOMMENDS TO MODE ON THIS FME ADDRESSED ON OTH ISSUE. IOA ALSO	HAT "POPPET FAII A/CIL. THIS IS ER QD FMEAS. TH RECOMMENDS ADDI GE EFFECTS (CORF	LS OPEN" BE ADD A CREDIBLE FAI HE SSM AGREED W ING A STATEMENT	LURE MODE AND IS

ASSESSME	ENT	ID:	: 1/01/88 NASA DATA: RCS-164 BASELINE [] 03-2F-101080-2 NEW [X]								-	
SUBSYSTE MDAC ID:			FRCS 164 MANI		2, 0	ROUND	PUF	RGE/DI	RAIN (COUP	LING	;
LEAD ANA	LYS	T:	C.D.	PRUS	ST							
ASSESSME	NT:											
		TICAL FLIGH		F	REDUN	IDANCY	SCF	REENS			CII	
	H	DW/FU	NC	A	, ·	В		C	2			
NASA IOA	[3 /3 3 /3]	[[]	[]	[]		[] *]
COMPARE	[/]	[]	[]	[]		[3
RECOMMEN	DAT	ions:	(1	f dif	fere	ent fro	om N	ASA)				
	[3 /3]	[]	[]	[]	(A	[DD/[] ELETE)
* CIL RE	TEN	TION	RATIC	NALE:	(If	appl	icab	A	DEQUA		[]
REMARKS: IOA FAIL COUPLE" FLOW" BE CREDIBLE THE SSM	URE AND AD FA	RES" DED A ILURE	TRICT S A F MODE	ED FI AILUR AND	OW". E MC IS A	IOA DE ON DDRESS	REC THI	ULD I OMMEN S FME	NCLUI	DE ": HAT THIS	FAII "RES IS	TRICTE A

ASSESSMEN ASSESSMEN NASA FME	TI.	ID:	RCS-	/88 165 F-1021	110-	-2			NASA BASE	DATA: LINE NEW	[-
SUBSYSTEM MDAC ID: ITEM:	м:		FRCS 165 MANI		3,]	ISOL VL	v						
LEAD ANA	LYS!	r:	C.D.	PRUS	r								
ASSESSME	T:												
(TICAL FLIGH	ITY	R	EDUI	NDANCY	SCREI	ENS	;		CII	_	
				. A		В			C				
NASA IOA	[]	3 /1R 3 /3]	[P]	[NA []	[P]		[]	*
COMPARE	[/N]	[N]	[N]	[N]		[}	
RECOMMEN	DAT	ions:	(1	f dif	fer	ent fro	m NAS	SA)					
	[/]	[]	[]	[]	(Al	[DD/I) DELI	ETE)
* CIL RE	TEN	TION	RATIO	NALE:	(I:	f appli	.cabl		ADEQU IADEQU	JATE JATE	_]	
REMARKS: IOA AGRE	ES	WITH	NASA,	'RI RA	TIO	NALE FO	R 3/	1R	PNP A	ASSIG	NMEI	1T.	-

NASA DATA:

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-166		NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 166 MANIFOLD 3, ISO	VLV		
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				_
FITCH	ITY REDUNDAN			CIL ITEM
HDW/FUI	NC A	В	С	
NASA [3 /1R IOA [2 /1R] [P]] [P]	P] [P] [P] P]	[x] *
COMPARE [N /	1 ()] []	[N]
RECOMMENDATIONS:	(If different	from NASA)	- · · · · · · · · · · · · · · · · · · ·
[2 /1R] [P]	[P] [P] (AI	[A] DD/DELETE)
* CIL RETENTION	RATIONALE: (If a	-	ADEQUATE NADEQUATE	[]
REMARKS: IOA WITHDRAWS 1/ CAPABILITY DURING (BASED ON POSSIBLE) IN THE FUTURE. IOA RECOMMENDS TO FAILURE MODES BE CERTAIN COMBINAT SIDE) COULD RESULUTE OF LIFE OR VEHIC	G RTLS & TAL, HOW LE INADEQUATE DUI HAT THE FAILED CO UPGRADED TO 2/10 IONS OF TWO FAIL LT IN INABILITY OF	SED ON LAC VEVER RECO MP) IF SUC LOSED AND R PPP AND JRES (LOSS TO DUMP FR	K OF CURREIMMENDS A 1, H A CAPABIL FAILS TO RI PLACED ON 1 OF YAW JET CS PROP ANI	NT FRCS DUMP /1 ABORT CRIT LITY EXISTS EMAIN OPEN THE CIL. IS ON SAME D POSSIBLE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-167 03-2F-101080-1	NASA DATA: BASELINE NEW	[]							
SUBSYSTEM: MDAC ID: ITEM:	167	ND PURGE/DRAIN COUPI	LING							
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
FLTGH	ITY REDUNDANG		CIL ITEM							
HDW/FU	NC A	ВС								
NASA [2 /1R IOA [2 /1R	[F] [F] [P] [F] [P] NA] [P]	[X] * [X]							
COMPARE [/] [и] [и][]	[]							
RECOMMENDATIONS:	(If different	from NASA)								
[2 /1R	[F] [F] [P] (AD	[A] DD/DELETE)							
	RATIONALE: (If app	plicable) ADEQUATE INADEQUATE	[]							
REMARKS: TOA AGREES WITH NASA/RI RATIONALE FOR FAILURE OF A AND B SCREENS. TOA RECOMMENDS THAT "POPPET FAILS OPEN" BE ADDED AS A FAILURE MODE ON THIS FMEA/CIL. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON OTHER QD FMEAS. THE SSM AGREED WITH THE IOA TISSUE. IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT PROP LEAKAGE EFFECTS (CORROSION, FIRE, EXPLOSION, EXPOSURE OF EVA AND GROUND CREWS).										
Compagnition of the comment of	gárding saum sa sa sia a sa sia si	n ellutization nu escripto	$\mathcal{H} = \mathbb{E}[\Sigma_{i}], \qquad \qquad .$							

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: RCS-168 NASA FMEA #: 03-2F-101080-2										ASA I BASEI	LINE	[]	
SUBSYSTE MDAC ID:				FRC: 168 MAN		3, G	ROUND	PUI	RGE/DR	AIN (COUP	LING	;	
LEAD ANALYST: C.D. PRUST														
ASSESSMENT:														
	CR		CAL LIGH	ITY	1	REDUN	DANCÝ	SCI	REENS					
	I			NC	i	A	В		С			CIL ITEM CIL ITEM [] * [] CDD/DELETE) [] FAILS TO "RESTRICTED IN THE STRICTED IN THE S		
NASA IOA	[3	/3 /3]	[]	[]	[]		[]	*
COMPARE	[/]	[]	[]	[]		[]	
RECOMMEN	DA:	ric	ons:	(If di	ffere	nt fr		NASA)					
	[3	/3]	ľ]	[]	[]	(A	[DD/[) ELF	ETE)
* CIL RE	TEI	n T]	ION	RATI	ONALE	: (If	appl	ical		DEOU	. me	r	7	
			-							DEQUA DEQUA]	
COUPLE" FLOW" BE	REMARKS: IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS TO COUPLE" AND "RESTRICTED FLOW". IOA RECOMMENDS THAT "RESTRICTED FLOW" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON OTHER QD FMEAS.													

THE SSM AGREED WITH THE IOA ISSUE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-169 03-2F-102110-2	NASA DATA: BASELINE NEW	
SUBSYSTEM:			
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
CRITICALI FLIGHT HDW/FUR			CIL ITEM
NASA [3 /1R IOA [3 /3] [P] [NA	[P]	[] * []
COMPARE [/N] [N] [N] [N]	[]
RECOMMENDATIONS:	(If different fro	om NASA)	
[/] [] [] [] (AD	[] D/DELETE)
-	RATIONALE: (If appli	.cable) ADEQUATE INADEQUATE	[] []
REMARKS: IOA AGREES WITH 1	NASA/RI RATIONALE FO	R 3/1R PNP ASSIGN	MENT.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-170 03-2F-102110-1	NASA DATA: BASELINE NEW								
SUBSYSTEM: MDAC ID:										
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
CRITICAL FLIGH	ITY REDUNDAN		CIL ITEM							
	NC A	ВС								
NASA [3 /1R IOA [2 /1R	[P] [[P] [P] [P] P] [P]	[] * [X]							
COMPARE [N /] [] [] []	[и]							
RECOMMENDATIONS:	(If different	from NASA)								
[2 /1R	[P] [P]	P] [P] (AD	[A] DD/DELETE)							
* CIL RETENTION	RATIONALE: (If app	plicable) ADEQUATE INADEQUATE	[]							
INADEQUATE [] REMARKS: IOA WITHDRAWS 1/1 ABORT ISSUE BASED ON LACK OF CURRENT FRCS DUMP CAPABILITY DURING RTLS & TAL, HOWEVER RECOMMENDS A 1/1 ABORT CRIT (BASED ON POSSIBLE INADEQUATE DUMP) IF SUCH A CAPABILITY EXISTS IN THE FUTURE. IOA RECOMMENDS THAT THE FAILED CLOSED AND FAILS TO REMAIN OPEN FAILURE MODES BE UPGRADED TO 2/1R PPP AND PLACED ON THE CIL. CERTAIN COMBINATIONS OF TWO FAILURES (LOSS OF YAW JETS ON SAME SIDE) COULD RESULT IN INABILITY TO DUMP FRCS PROP AND POSSIBLE VIOLATIONS OF ENTRY MASS PROPERTIES CONSTRAINTS LEADING TO LOSS OF LIFE OR VEHICLE DURING ENTRY.										

ASSESSMENT ID: RCS-171 B. NASA FMEA #: 03-2F-101080-1											ASA DATA BASELINE NEV] 3]			
SUBSYSTE MDAC ID: ITEM:	M:			FRCS 171 MANI		D 4	4, GR	OUI	ND	PURG	E/1	DRA	AIN COUI	PLI	NG		
LEAD ANALYST: C.D. PRUST																	
ASSESSMENT:																	
	CR			ITY		RI	EDUND	AN	CY	SCRE	EN!	S			IL TE		
•			LIGH' W/FU	NC		A			В			C			1 E	l'1	
NASA IOA	[2 2	/1R /1R]	[F P]	[F N2] A]	[P P]	[X X]	*
COMPARE	[/]	[N]	[N]	[]	(]	
RECOMMEN	DA'	ri(ons:	(I	f d:	if	feren	t :	fro	om NA	SA)					
	[2	/1R	1	[F]	[F]	[P] (2		A /D		ETE)
* CIL RE	TE:	NT:	ION 1	RATIO	NAL]	Ε:	(If	ap]	pl:	icabl	e) Il	IA IAN	DEQUATE DEQUATE]]	
REMARKS: IOA AGRE IOA RECO MODE ON ADDRESSE ISSUE. ABOUT PR	MM TH D IO	EN IS ON A	DS T FME OTH ALSO	HAT " A/CIL ER QD RECO	POP FMI MMEI	PET TH EAS NDS	FAI S IS S ADD	LS A HE IN	OI CI SS	PEN" REDIB SM AG A STA	ILU BE LE REI	JRI AI FA ED MEN	E OF A ADDED AS ALLURE M WITH TH	ND A IOD IE IE	B FA E IO EF	S IL AN A FE	CREENS URE D IS CTS

na daga kan daga daga 1861 ya Araba ya kata da Araba ya Araba da OF EVA AND GROUND CREWS).

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: RCS-172 NASA FMEA #: 03-2F-101080-2										SA DAT ASELIN NE]	
SUBSYSTE MDAC ID: ITEM:			1	RCS 72 ANIFO	DLD	4, G	ROUND	PU	RGE/DRA	IN COU	PLING	;	
LEAD ANA	LYS	T:	С	.D. I	PRUS	ST							
ASSESSME	NT:												
	CRI			Y	I	REDUNI	DANCY	SC	REENS		CII		
FLIGHT ITEM HDW/FUNC A B C													
NASA IOA	[3 / 3 /	3] 3]		[]	[[]	[[] *	r
COMPARE	1	/]		[]	[]	[]	[]	
RECOMMEN	DA I	ON	s:	(If	di	ffere	nt fr	om 1	NASA)				
	[3 /	3]		[]	[]	ξ]	[ADD/I		TE)
* CIL RE	TEN	TIO	n RA	TION	ALE	: (If	appl	ica		ЕОПАТЕ	: г	1	
									INAC	EQUATE EQUATE		j	
REMARKS: IOA FAII COUPLE" FLOW" BE CREDIBLE	URE ANI AI	"R	ESTR AS	ICTEI A FA) F	LOW".	IOA DE ON	RE TH	COMMEND IS FMEA	S THAT	"RES	STRIC A	

THE SSM AGREED WITH THE IOA ISSUE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-173 03-2F-102170-2	NASA DATA: BASELINE [] NEW [X]	
	FRCS 173 MANIFOLD 5, ISOL VLV		
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
FLIGH'		SCREENS CIL ITEM	
HDW/FU	NC A B	С	
NASA [3 /2R IOA [3 /3] [P] [P]	[P] []* [] []	
COMPARE [/N] [N] [N]	[и] [и]	
RECOMMENDATIONS:	(If different from	n NASA)	
[3 /1R] [P] [NA]	[P] [] (ADD/DELETE)	-
* CIL RETENTION 1	RATIONALE: (If applic	cable) ADEQUATE [] INADEQUATE []	
REMARKS: IOA NOW CLASSIFIE PNP.	ES "FAILS OPEN", AND	"INTERNAL LEAKAGE" AS A 3/3	1R
TO 3/1R PNP. INCLOSS OF PROP FROM EXPLOSION, EXPOSIONANY LEAKAGE OF PROPERTY.	ABILITY TO ISOLATE A M TANK AND PROP LEAKA URE OF EVA AND GROUND	LURE PER NSTS-22206.	

ASSESSME ASSESSME NASA FME	NT ID:		4	L70 - 1				ASA DATA BASELINE NEW			
SUBSYSTE MDAC ID:		FRCS 174 MANIFO	LD 5	s, Iso	OL V	ĽV	-				
LEAD ANA	LYST:	C.D. PI	RUSI								
ASSESSME	NT:										
	CRITICAL		RE	EDUNDA	ANCY	SCREE	ENS		CIL		
	FLIGH HDW/FU		A		В		C		IIE	M	
NASA IOA	[2 /2 [2 /2]	[]	[]	[]	[X [X	*	
COMPARE	[/]	[].	[]	[]	[]	
RECOMMEN	DATIONS:	(If	diff	ferent	t fr	om NAS	SA)				
	[/		[]	[]	[] (A	[\DD/D] ELETE)	
* CIL RE	TENTION	RATIONA	LE:	(If a	appl	icable			-	-	
								DEQUATE DEQUATE	-]	
REMARKS: NO DIFFE	RENCES.									LOSS O	F

ASSESSMENT DA ASSESSMENT II NASA FMEA #:	ATE: 1/01/88 D: RCS-175 03-2F-1	01080-1	N 2 1	ASA DATA: BASELINE NEW	[x]
SUBSYSTEM: MDAC ID: ITEM:	FRCS				
LEAD ANALYST	C.D. PR	JST			
ASSESSMENT:					
	ICALITY LIGHT	REDUNDANC	Y SCREENS		CIL ITEM
HDV	/FUNC	A	В С		
NASA [2 IOA [2	/1R] [/1R] [F] [P] [F] [P NA] [P] !	[X] *
COMPARE [/] [и] [и][]	[]
RECOMMENDATIO	ONS: (If d	ifferent f	rom NASA)		
[2	/1R] [F] [F] [P] [(ADI	[A] D/DELETE)
* CIL RETENT	ON RATIONAL	E: (If app			
			Al INAI	DEQUATE DEQUATE	
REMARKS: IOA AGREES WI IOA RECOMMENT MODE ON THIS ADDRESSED ON ISSUE. IOA A ABOUT PROP LI OF EVA AND GE	OS THAT "POP FMEA/CIL. " OTHER QD FMI ALSO RECOMMEI EAKAGE EFFEC	PET FAILS THIS IS A EAS. THE NDS ADDING TS (CORROS	OPEN BE AL CREDIBLE FA SSM AGREED A STATEMEN	DDED AS A AILURE MOI WITH THE NT TO THE	FAILURE DE AND IS IOA EFFECTS

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: RCS-176 NASA FMEA #: 03-2F-101080-2									N		DATA ELINE NEW	[]	
SUBSYSTI MDAC ID: ITEM:				FRCS 176 MANI		5, G	ROUND	PU	RGE/DF	RAIN	COUP	LING	;	
LEAD AND	LY	ST	:	C.D.	PRUS	Т								
ASSESSMI	ENT	:												
	CR		ICAI LIGH	ITY	R	EDUN	DANCY	sc	REENS			CII		
		-	W/FU	_	A		В		c	2		T 1 1	3F1	
NASA IOA	[3	/3 /3]	[]	[.]	[[]		[[]	*
COMPARE	[/]	[]	[]	[]		[]	
RECOMMEN	IDA	TI	ons:	(1	f dif	fere	nt fro	mc	NASA)					
	[3	/3]	[]	[]	. []	(A	[DD/[ELI	ETE)
* CIL RI	ETE	NT	ION	RATIO	NALE:	(If	appl	ica	•	DEAL	y a mus		,	
2277277											JATE JATE	[]	
REMARKS: IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS TO COUPLE" AND "RESTRICTED FLOW". IOA RECOMMENDS THAT "RESTRICTED FLOW" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON OTHER QD FMEAS. THE SSM AGREED WITH THE IOA ISSUE.														

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	: 1/01/88 RCS-177A 03-2F-102	2170-3	NASA DATA: BASELINE [] NEW [X]							
SUBSYSTEM: MDAC ID: ITEM:	177	ISOL VLVS								
LEAD ANALYST:	C.D. PRUS	ST								
ASSESSMENT:										
FLIG	LITY F HT		SCREE		CIL					
HDW/F	UNC A	A F	3	С						
NASA [1 /1 IOA [1 /1] [] []	[]	[X [X] *]				
COMPARE [/	j [] []	[]	[]				
RECOMMENDATIONS	: (If dir	fferent fi	om NAS	SA)						
[1 /1] [] []] ELETE)				
* CIL RETENTION	RATIONALE	: (If app]	licable	ADEQUATI	E []				
REMARKS: THIS FMEA/CIL OF THE VERNIER MAN FAILURE MODE, H POSSIBLE EXPOSU VAPORS. NASA/R EXTERNAL LEAKAGE THE SSM AGREED LINE EXTERNAL I CORRESPONDING R	IFOLD ISOLA OWEVER DOES RE OF EVA A I DO NOT CO E OF THE VA THAT THIS VA EAKAGE FMEA	ATION VALVE RECOMMENT OF STRUCK STRUCK STRUCK HOUS IN THE BODY ALVE BODY A (03-2F-1)	VE. IC ND THAT O CREWS CTURAL ING ON V SHOUI	THE EFFE TO PROP (FAILURE, I THIS FMEA LD BE ADDE	ISSUE ' CTS DI OR PRO RUPTUR OR EL	WITH THIS SCUSS THE P E, OR SEWHERE.				

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	RCS-177 03-2F-1	02112-1		BAS	SELINE [NEW [x]	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 177 MANIFOL	D ISOL 7	/LVS				
LEAD ANALYST:	C.D. PR	UST					
ASSESSMENT:							
CRITICA FLIG	LITY	REDUNDA	ANCY SO	CREENS	C: I'	IL TEM	
	UNC	A	В	С			
NASA [1 /1 IOA [1 /1] []	[]	[]	•	x]	
COMPARE [/] []	[]	[]	[j	
RECOMMENDATIONS	: (If d	ifferen	t from	NASA)	·		,
[1 /1] []	[]	[]	[(ADD,	A] /DELI	ETE)
* CIL RETENTION	RATIONAL	E: (If	applica	ADE	QUATE [QUATE []]	
REMARKS: THIS FMEA/CIL OF THE PRIMARY MAN FAILURE MODE, H POSSIBLE EXPOSU VAPORS. NASA/F EXTERNAL LEAKAGE THE SSM AGREED LINE EXTERNAL I CORRESPONDING F	IFOLD ISO OWEVER DO IRE OF EVA I DO NOT E OF THE THAT THIS LEAKAGE FM	LATION YES RECOIDED TO THE CONTROL OF THE CONTROL O	WALVE. MMEND COUND	IOA HAS THAT THE REWS TO P RAL FAILU ON THIS HOULD BE	NO ISSUI EFFECTS I ROP OR PI RE, RUPT FMEA OR I ADDED TO	E WIT DISCT ROP URE, ELSET	TH THIS USS THE OR WHERE.

ASSESSMEN NASA FMEA	NT ID:	RCS-17						BASELINE NEW	٢]	
SUBSYSTEM MDAC ID: ITEM:		FRCS 178 MANIFO	LD I	SOL V	/LVS							
LEAD ANAI	LYST:	C.D. P	RUSI			1275						
ASSESSMEN	NT:											
	CRITICAL: FLIGHT HDW/FUI	r								CL CEM	1	
NASA IOA	[]	[]	[]	[]	[x]	*
COMPARE	[N /N]	[]	[]	[1	[N]	
RECOMMENI												
	[2 / 2]]	[]	[];] (AI	[DD/	A /DE		ETE)
* CIL RET	TENTION I	RATIONA	LE:	(If a	appli	cable	e) AD INAD	EQUATE EQUATE	[]	
NASA/RI I WITHDRAWS A THRUSTI ABORT ISS RTLS & TA POSSIBLE FUTURE. IOA RECOMON THE FA	S 1/1 CREER COULD SUE DUE TAL, HOWEY INCOMPLIAMENDS TI	IT, BUT CAUSE TO LACK VER REC ETE DUM HAT THE	BURN OF OMME P) I	INTAIN I-THRO CURRE ENDS A IF SUC	NS CO DUGH. ENT F A 1/1 CH A	IOP FRCS I ABOF CAPAE	N THA A ALS DUMP RT CR BILIT	T RESTRIO WITHDE CAPABILIT (BASE Y EXISTS	CT RAV CTY ED ED BI	TED VS ON IN	1/ OUR I A TH	LOW TO 11 RING LE DRESSED
ADDED TO 03-2F-102 HOWEVER, ASSESSMEN	03-2F-10 2170-1 (2 10A REC	02110-1 2/2) FO OMMENDS	(3/ R VE A 2	'IR PE RNIEF !/IR E	PP) F R MAN FOR C	OR PRIJECT	RIMAR OS. -1021	Y MANIFO	L	S		

ASSESSMENT I ASSESSMENT I NASA FMEA # 8	DATE: [D:	1/01/8 RCS-17 03-2F	38 79 -1213	308-1				ASA DA BASELI		[
SUBSYSTEM: MDAC ID: ITEM:		FRCS 179 JET A	LIGNN	MENT 1	BELL	ows, 1	PRIM	ARY, 1	ALL	AXI	ES	
LEAD ANALYS	r:	C.D. 1	PRUST	ŗ								
ASSESSMENT:												
	rical: Fligh	ITY	RI	EDUND	ANCY	SCRE	ENS			CII		
		NC	A		В		С				11.1	
NASA []	l /1 l /1]	[]	[[]	[]		[]	[] []	*
COMPARE [/]	[]	[]	[]	-	[]	
RECOMMENDAT	cons:	(If	dif	feren	t fr	om NA	SA)					
. [/	1	[]	[-]	[]	(AI	[DD/I)EL	ETE)
* CIL RETENT	rion 1	RATION	ALE:	(If	appl	icable		DEQUA' DEQUA'	re re	[]	
REMARKS: IOA RECOMMENT LEAKAGE OF NOTE HAZARD TO EVICA ALSO RECOMMENT RELIEVE AND CAUSES ON TO	PROP 'VA AN'COMME'COMME	TO BE (D GROUI NDS THE LLURE (CRITI ND CI AT "]	CAL REWS.	AFTE: VALV	R ET S E REL	EVIS: SEP :	ED. : ALSO, DEVIC	IOA AS E FA	CON WEI	NSI LL : JRE	AS A
CHOOLD ON I	LLU F											

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:				ASA I BASEI]			
SUBSYSTEM: MDAC ID: ITEM:	FRCS 180 JET AL	GNMENT	BELL	.ows,	PRIM	ARY,	ALL	AXE	S	
LEAD ANALYST:	C.D. PI	RUST								
ASSESSMENT:										
CRITICA FLIG	LITY HT	REDUN	DANCY	SCR	EENS			CIL		
HDW/F		A	В	3	C				-	
NASA [/ IOA [1 /1]		[]				[x]	*
COMPARE [N /N]	[]	[]	[]		[N]	
RECOMMENDATIONS	: (If o	differe	nt fr	om N	ASA)			-		
[/	j	[]	[1	(]	(AI	[DD/D		ETE)
* CIL RETENTION	RATIONA	LE: (If	appl	icab:	A	DEQUA]	
REMARKS: NASA/RI DO NOT NOW CONSIDERS T BE QUESTIONABLE MODE IN THE FME	HE CREDII . IOA DO A/CIL TO	BILITY O DES NOT BE AN	OF REGA OPEN	STRI RD TI ISSU	(REST CTED HE AE E,	RICTI FLOW SENCI	ED FI IN A E OF	LOW) A BE: THI:	LLC	WS TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/01/88 RCS-181 03-2F-121310-2	NASA DAT BASELIN NE	
SUBSYSTEM: MDAC ID: ITEM:	181	P SOLENOID VLV, PRIM	ARY, ALL AXES
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
FLIGH	T	ANCY SCREENS	CIL ITEM
HDW/FU		ВС	
NASA [3 /1R IOA [1 /1	[F]] []	[P] [P] [] []	[X] *
COMPARE [N /N] [N]	[и] [и]	[]
RECOMMENDATIONS:	(If differen	t from NASA)	
[1 /1] []	[] [] ([A] ADD/DELETE)
* CIL RETENTION	RATIONALE: (If	applicable) ADEQUATE INADEQUATE	[]
ON". IOA RECOMM 1/1 BECAUSE IT R SINGLE FAILURE R AS A 1/1. PROP AND GROUND CREW.	ENDS THAT THE F. ESULTS IN LEAKAGESULTING IN PRO- LEAKAGE PRESENT FROM A LOSS O	HEET SHOULD NOT INCL AILED OPEN MODE BE U GE OF PROP. PER NST P LEAKAGE SHOULD BE S A HAZARD TO THE CR F THRUSTER STANDPOIN 2/1R FPP. SEE ASSES	PGRADED TO A S 22206, ANY CLASSIFIED EW, VEHICLE, T, IOA

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:					SA DATA: ASELINE NEW]		
SUBSYSTEM: MDAC ID: ITEM:		BIPROI	osol	ENOIL) ATA	, PRIMAF	RY,	ALI	L AXES
LEAD ANALYST:	C.D. PRUS	ST							
ASSESSMENT:									
CRITICAL: FLIGH	ITY 1	REDUNDA	ANCY	SCREE	ens		CII	_	
	NC .	A.	В		С	÷	111	J11	
NASA [/ IOA [1 /1] []	[]	[]	[]	x]	*
COMPARE [N /N] []	[]	[]	[]	4]	
RECOMMENDATIONS:	(If di	fferent	fro	m NAS	SA)				
[1 /1] []	(] .	[] (AI		A] DELE	ETE)
* CIL RETENTION	RATIONALE	: (If a	appli	cable		EQUATE EQUATE	[]	•
REMARKS: NASA/RI DO NOT CO RUPTURE, EXTERNA SSM AGREED THAT ' EXTERNAL LEAKAGE RETENTION RATION	L LEAKAGE THIS VALVI FMEA (03-) FOR 1 E BODY -2F-102	THE T SHOU 2108-	HRUST LD BE 1) WI	TRUC ER S ADD TH C	TURAL FAOLENOID ED TO THOORRESPON	VAI VAI	JRE, LVE. PROF	THE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-183	·	NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:) VLV, PRIMA	RY, ALL AXES		
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAL: FLIGH	ITY REDUND	ANCY SCREE	ens	CIL ITEM
HDW/FU	NC A	В	c .	TIM
NASA [/ IOA [1 /1] []	[]	[]	[
COMPARE [N /N] []	[]	[]	[N]
RECOMMENDATIONS:	(If differen	t from NAS	SA)	
[2 /1R] [F]	[P]	[P] (A	[A] DD/DELETE)
* CIL RETENTION	RATIONALE: (If	applicable	ADEQUATE INADEQUATE	[]
REMARKS: NASA/RI DO NOT COMITHDRAWS 1/1 CR A THRUSTER COULD ABORT ISSUE DUE DURING RTLS & TA A POSSIBLE INCOME FUTURE. IOA RECOMMENDS TO ON THE FMEA/CIL. ADDED TO 03-2F-1 2/1R FPP FOR 03-	IT, BUT MAINTAI RESULT IN BURN TO LACK OF CURR L, HOWEVER RECO PLETE DUMP) IF HAT THE RESTRIC THE SSM AGREE 21310-3 (3/1R F	NS CONCERN -THROUGH. ENT FRCS D MMENDS A 1 SUCH A CAF TED FLOW F D THAT THI PP). HOWE	RESTRICTED FOR THAT RESTRICTED FOR THAT RESTRICTED FOR THE PART OF	LOW). IOA ICTED FLOW TO ITHDRAWS 1/1 ITY IT (BASED ON STS IN THE BE ADDRESSED ODE SHOULD BE COMMENDS A

1/01/88 RCS-184 03-2F-1	21310-3		NASA DATA BASELINE NEW	
FRCS 184			O VLV, PRIMA	RY, -X AXIS
C.D. PR	UST	÷		
ITY	REDUNDA	NCY SCRE	ens	CIL ITEM
	A	В .	С	IILM
] [F] P]	[P] [P]	[P] [P]	[X] *
] [N]	[]	[]	[N]
(If d	ifferent	from NAS	SA)	
] [F]	[P j	[P] (A	[A] DD/DELETE)
RATIONAL	E: (If a	pplicable	e) ADEQUATE INADEQUATE	
ERS IN THE TRANSPORT THE TRANS	HE SAME E LOSS C ERS ARE F-121310	AXIS TO I F ALL -X NOT REQUI -3 INCLUI	BE REDUNDANT THRUSTERS TO TRED FOR ET DES THRUSTER	TO EACH O BE ONLY A SEP OR S IN ALL
	RCS-184 03-2F-1 FRCS 184 THRUSTE C.D. PR ITY T NC [] [[[] [] [] [] [] [] [] [RCS-184 03-2F-121310-3 FRCS 184 THRUSTER BIPROF C.D. PRUST ITY REDUNDAT ITY REDUNDAT IT NC A [F]	RCS-184 03-2F-121310-3 FRCS 184 THRUSTER BIPROP SOLENOIS C.D. PRUST ITY REDUNDANCY SCREET TO A B [F] [P] [P] [N] [P] [N] [P] (If different from NAS] [F] [P] RATIONALE: (If applicable NASA/RI RATIONALE FOR FAI ERS IN THE SAME AXIS TO INCLUSE X THRUSTERS ARE NOT REQUIRED.	RCS-184 03-2F-121310-3 FRCS 184 THRUSTER BIPROP SOLENOID VLV, PRIMA C.D. PRUST ITY REDUNDANCY SCREENS T NC A B C [F] [P] [P] [P] [N] [P] [P] [P] (If different from NASA) [F] [P] [P] [P] (ARATIONALE: (If applicable) ADEQUATE INADEQUATE INADEQUATE NASA/RI RATIONALE FOR FAILURE OF A S ERS IN THE SAME AXIS TO BE REDUNDANT IDERS THE LOSS OF ALL -X THRUSTERS TO STATE TO ST

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-185 03-2F-1213	.310-2	NASA DATA: BASELINE [] D-2 NEW [X]					
SUBSYSTEM: MDAC ID: ITEM:	FRCS 185			PRIMARY, -X	AXIS			
LEAD ANALYST:	C.D. PRUS	T		▼ - 100				
ASSESSMENT:								
CRITICAI FLIGH	ITY R	REDUNDANCY	SCREENS	CIL ITEM				
	NC A	В	С	••				
NASA [3 /1F IOA [1 /1	[F	[P] [P]	[X]	*			
COMPARE [N /N] [N	и] [и] [N]	[]				
RECOMMENDATIONS:	(If dif	ferent fro	om NASA)	e de la companya de l				
[1 /1] [] [] []	[A] (ADD/DEL				
* CIL RETENTION	RATIONALE:	: (If appli	וח ב	EQUATE []				
REMARKS: IOA RECOMMENDS TO A 1/1 BECAUSE ANY SINGLE FAILU AS A 1/1. PROP VEHICLE, AND GRO	TIT RESULTI PRE RESULTI LEAKAGE PROUND CREW.	IS IN LEAKA ING IN PROP RESENTS A P	AGE OF PROP PLEAKAGE S HAZARD TO	P. PER NSTS- SHOULD BE CLA THE CREW,	22206, SSIFIED			
FROM A LOSS OF THE BE A 3/2R FPP.	THRUSTER ST SEE ASSESS	TANDPOINT, SMENT SHEET	IOA CONSII RCS-184.	DERS THIS FAI	LUKE TO			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-186 03-2F-1	21310-3	NASA DATA: BASELINE [] NEW [X]						
SUBSYSTEM: MDAC ID: ITEM:	186	R BIPROP S	SOLENOID VL	V, PRIMAR	Y, Y AXIS				
LEAD ANALYST:	C.D. PRI	JST							
ASSESSMENT:									
FLIGH'	r		CY SCREENS		CIL ITEM				
HDW/FU	NC	A	ВС						
NASA [3 /1R IOA [2 /1R] [F] [P] [P P]	[X] * [X]				
COMPARE [N /] [и] [] [] [[]				
RECOMMENDATIONS:	(If d	ifferent f	from NASA)						
[2 /1R] [F] [P] [P		[D/DELETE)				
* CIL RETENTION 1	RATIONALI	E: (If app	olicable) A INA	DEQUATE [[] []				
REMARKS: IOA AGREES WITH ! WITHDRAWS 1/1 ABO			FOR FAILUR	E OF A SCE	REEN. IOA				
CAPABILITY DURING	RTLS &	TAL, HOWE	VER IOA RE	COMMENDS A	1/1 ABORT				
CRIT (BASED ON A EXISTS IN THE FUTTO BE REDUNDANT	TURE. IC	DA CONSIDE OTHER. IC	RS THRUSTED A RECOMMEND	RS IN THE DS THAT TH	SAME AXIS IE FAILED				
CLOSED FAILURE MO									
UPGRADED TO A 2/1 RESULT IN INABIL									

AXIS.

VIOLATIONS OF ENTRY MASS PROPERTIES CONSTRAINTS AND LOSS OF LIFE OR VEHICLE DURING ENTRY. 03-2F-121310-3 INCLUDES THRUSTERS IN

ALL AXES, AND THE CRITICALITY ASSIGNED IS FOR THE WORST-CASE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-187 03-2F-121310-2	NASA DATA: BASELINE [] NEW [X]								
SUBSYSTEM: MDAC ID: ITEM:	FRCS 187 THRUSTER BIPROP SOLENOID	VLV, PRIMARY, Y AXIS								
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
CRITICAL: FLIGH	ITY REDUNDANCY SCREEN	NS CIL ITEM								
HDW/FUI	NC À B	C								
NASA [3 /1R IOA [1 /1] [F] [P]	[P]								
COMPARE [N /N] [и] [и]	[N] []								
RECOMMENDATIONS:	(If different from NASA	7)								
[1 /1] [] []	[] [] (ADD/DELETE)								
e de la companya de la companya de la companya de la companya de la companya de la companya de la companya de	RATIONALE: (If applicable)	ADEQUATE [] INADEQUATE []								
REMARKS: IOA RECOMMENDS THAT THE INTERNAL LEAKAGE FAILURE MODE BE UPGRADED TO A 1/1 BECAUSE IT RESULTS IN LEAKAGE OF PROP. PER NSTS-22206, ANY SINGLE FAILURE RESULTING IN PROP LEAKAGE SHOULD BE CLASSIFIED AS A 1/1. PROP LEAKAGE PRESENTS A HAZARD TO THE CREW, VEHICLE, AND GROUND CREW. FROM A LOSS OF THRUSTER STANDPOINT, IOA CONSIDERS THIS FAILURE TO BE A 2/1R FPP. SEE ASSESSMENT SHEET RCS-186.										

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		21310-3	NASA DATA: BASELINE [] NEW [X]							
SUBSYSTEM:	FRCS			VLV, PRIMA	RY, Z AXIS					
LEAD ANALYST:	C.D. PRO	JST								
ASSESSMENT:										
FLIGHT	r		NCY SCREEN B	rs C	CIL ITEM					
HDW/FUI		A								
NASA [3 /1R IOA [3 /2R] . [F] P]	[P] [[P] [P] P]	[X] * []					
COMPARE [/N] [N]	() (]	[N]					
RECOMMENDATIONS:	(If d	ifferent	from NASA	7)	<u></u>					
[/] []	[] [[] (A	[] DD/DELETE)					
* CIL RETENTION	RATIONAL	E: (If a		ADEQUATE	[]					
REMARKS: 10A AGREES WITH THRUSTERS IN THE AXIS TO BE REDUN THRUSTERS IN ALL WORST-CASE AXIS.	Z AXIS. DANT TO	IOA COI EACH OTHI	E FOR 3/1F NSIDERS TH ER. 03-2F	R FPP ASSIG IRUSTERS IN 7-121310-3	NMENT FOR THE SAME INCLUDES					

ASSESSMENT DA ASSESSMENT II NASA FMEA #: SUBSYSTEM:	RCS-18 03-2F-	8 9 121310-2		BASELINE [] NEW [X]				
SUBSYSTEM: MDAC ID: ITEM:				D VLV, PRIM	ARY, Z AXIS			
LEAD ANALYST:	C.D. P	RUST						
ASSESSMENT:								
FI	CALITY IGHT /FUNC		ANCY SCRE		CIL ITEM			
			_	_				
NASA [3 IOA [1	/1R] /1]	[F] []	[P]	[P]	[X] * [X]			
COMPARE [N	/N]	[и]	[N]	[N]	[]			
RECOMMENDATIO	NS: (If	differen	t from NA	SA)				
[1	/1]	[]	[]	[]	[] ADD/DELETE)			
* CIL RETENTI	ON RATIONA	LE: (If	applicabl	e) ADEQUATE INADEQUATE				
TO A 1/1 BECA ANY SINGLE FA AS A 1/1. PE VEHICLE, AND	USE IT RES ILURE RESU OP LEAKAGE GROUND CRE	ULTS IN T LTING IN PRESENTS W.	LEAKAGE O PROP LEA S A HAZAR	F PROP. PE KAGE SHOULD D TO THE CR	DE BE UPGRADEI R NSTS-22206, BE CLASSIFIEI EW, HIS FAILURE TO			
BE A 3/1R FPI	. SEE ASS	ESSMENT	SHEET RCS	-188.				

ASSESSME ASSESSME NASA FME	NT	I		1/01, RCS-: NONE					. 1		DATA: LINE NEW	[]	
SUBSYSTE MDAC ID:				FRCS 190 JET	ALIG	nment	BELI	.ows,	VER	NIER,	ALL	ΑΣ	(ES	5	
LEAD ANA	LY	ST	:	c.D.	PRUS	ST									
ASSESSME	NT	:													
	CR			ITY	1	REDUN	IDANCY	SCF	EENS			C]			
]		LIGH W/FU		1	A	F	3	(· ·		TA	CEM	1	
NASA IOA	[1	/1]	[]	. []]]		[X]	*
COMPARE	[N	/N]	[]	Ţ]	Ţ]		[N]	
RECOMMEN	IDA'	TI	ONS:	(I:	f di:	ffere	ent fi	om N	(ASA)						
	[/]	[]	Į.]	ľ]	(AI	[/QC	/DF] ELE	TE)
* CIL RE	ete:	NT:	ION	RATIO	NALE	: (I1	appl	licab	1	ADEQU ADEQU	JATE JATE	[]	
REMARKS: THERE AF LINES.	RE I	ΝО	ALI	GNMEN'	r bei	LLOWS	on 1	THE V	'ERNI	ER TH	RUSTI	ER	PF	ROP	

ASSESSME ASSESSME NASA FME	NT ID:	1/01/8 RCS-19 NONE						ASA 1 BASE1		[]	
SUBSYSTE MDAC ID:	M:	FRCS 191 JET A	LIGNM	IENT	BELL	ows,	VERN:	IER,	ALL	ΑX	ŒS	}	
LEAD ANALYST: C.D. PRUST													
ASSESSME	NT:												
	CRITICAL		RE	EDUNE	ANCY	SCRE	EENS			C]	IL PEM	7	
	FLIGH HDW/FU		A		В		С				L List.	•	
NASA IOA	[/ [1 /1]	[]	[]	[]		[X.]	*
COMPARE	[N /N]	[]	[]	[3		[N]	
RECOMMEN	DATIONS:	(If	diff	ferer	nt fr	om NA	ASA)						
	[/]	[]	[]	[]	(AI	[/QC	/DE] ELE	TE)
* CIL RE	TENTION	RATION	ALE:	(If	appl	icabl	A	DEQU.		[]	
REMARKS:	RE NO ALI	GNMENT	BELI	LOWS	ON T	HE VI	ERNIE	R TH	RUSTI	ER	PF	ROP	

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: RCS-192 NASA FMEA #: 03-2F-131310-2									N	IASA BASI	DATA ELINE NEW	: [x]		
SUBSYSTEM MDAC ID: ITEM:	<i>s</i> .			TDC9	2											
LEAD ANAI																
ASSESSMEN	VT:															
		ET	TCH	(T)	R) A					:			IL FEN			
NASA IOA	[2 1	/2 /1]	[]	[]	[]		[X]	*	
COMPARE	[N	/N]	[]	[]	[]		[]		
RECOMMENI				•					-							
	[1	/1]	[]	}	[]	[]	(A		/DI		TE)	
* CIL RET	ren	TI	ON	RATIO	ONALE:	(If	appl	ical	ole) A INA	DEQI	JATE JATE]]		
REMARKS: IOA FAILU ON". IOA 1/1 BECAU SINGLE FA AS A 1/1. AND GROUN FROM A LO NASA/RI 2 ITEMS INC	A R JSE AII ND DSS 2/2	EC UF PF CF	COMM RE F ROP REW. OF V	ENDS RESUL' RESUL' LEAK VERNI GNMEI	THAT TO SERVICE THAT THE THE THE THE THE THE THE THE THE TH	THE LEAH N PH ESEN USTH OA #	FAILED KAGE OF ROP LES ITS A D RESTAN	O OI F PI AKAC HAZZ HAZZ NDPC	PEN MC ROP. SE SHC ARD TC OINT, MMENDS	DE DER DULD THI	SE UP NSTS BE C E CRE AGRE	GRA LAS W, ES	ADE 220 SSI VE WI SUE	ED 06, FI EHI ETH SAS	TO AN ED CLE TH	Y , E BL

ASSESSME ASSESSME NASA FME	1	NASA DATA: BASELINE [] NEW [X]						,					
SUBSYSTE MDAC ID:			FRCS 193 THRU	STER	BIPR	OP SC	LENO	ID VI	LV, VER	NIER	s,	ALL	AXES
LEAD ANA	ANALYST: C.D. PRUST												
ASSESSME	NT:												
CRITICALITY REDUNDANCY SCREENS										C:	IL FEN	ĸ	
	FLIGHT HDW/FUNC					F	В		С		LL	1	
NASA IOA	[2 [2	/2 /2]	[]	[[]] []	[X X] *	
COMPARE	[/] .	[]	[]	[]	[]	
RECOMMEN	DATI	ons:	(I	f di	ffere	nt fi	com N	ASA)					
	[/]]	[]	נ]		/DI] ELETE	2)
* CIL RE	TENT	ION	RATIO	NALE	: (If	app]	licab		ADEQUAT ADEQUAT]	
REMARKS: NO DIFFE INCLUDED	RENC	ES. THIS	IOA FMEA	RECOI	MEND SEPAR	S THA	HT TH	E SU	BASSEME IVIDUAI	LY I	TEI AS	rs •	,

ASSESSMENT	SSESSMENT DATE: 1/01/88 SSESSMENT ID: RCS-194 ASA FMEA #: NONE								NASA DATA: BASELINE [] NEW []						
SUBSYSTEM: MDAC ID: ITEM:		1	RCS 94 HRUSTEI	R BIPI	ROP S	OLENC	OID VI	.V, V	ERNIE	ERS,	AI	LL AXES			
LEAD ANALY	ST:	С	.D. PRI	UST											
ASSESSMENT	r:														
CI	FLI	GHT							V - E **	CII					
	HDW/	FUNC		Α]	В	C								
NASA ([1 /	1]	[]	[]] K]]	*			
COMPARE [N /	n j	[]	[]	[]		[N	[]				
RECOMMENDA	ATION	s:	(If d	iffere	ent fi	rom N	IASA)								
Į	1/	1]	[]	[]	[]		[A		ETE)			
* CIL RETE	ENTIO	N RA	rionali	E: (I1	app:	licak		DEQU	JATE JATE]				
REMARKS: NASA/RI DO RUPTURE, I SHOULD BE 102108-1)	EXTER ADDE	NAL D	LEAKAGI THE PI	E). T	THE S	SM AC	(STRU REED IAL LE	CTUR THAT AKAG	RAL FA	ILU VA	RE,	BODY			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-195 03-2F-131310-2	2	NASA DA BASELI 1	ATA: INE [] NEW [X]				
MDAC ID:	FRCS 195 THRUSTER BIPRO	OP SOLENOI	ID VLV, VEI	RNIERS, ALL AXES				
LEAD ANALYST:	C.D. PRUST							
ASSESSMENT:	ASSESSMENT:							
CRITICAL FLIGH	CIL ITEM							
	NC A	В	С	IIEM				
NASA [2 /2 IOA [1 /1] []	[]	[]	[X] * [X]				
COMPARE [N /N] . []	[]	[]	[]				
RECOMMENDATIONS:	(If differe	nt from NA	ASA)					
[1 /1] []	[]	[]	[] (ADD/DELETE)				
* CIL RETENTION REMARKS:	* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []							
				MODE BE UPGRADED				
ANY SINGLE FAILU CLASSIFIED AS A	RE WHICH RESULT 1/1. PROP LEAD	TS IN PROI KAGE PRESI	P LEAKAGE S ENTS A HAZZ	SHOULD BE ARD TO CREW,				
VEHICLE, AND GRO STANDPOINT, IOA RECOMMENDS THAT	AGREES WITH TH	E NASA/RI	2/2 ASSIGN	NMENT. IOA ALSO				

BE SEPARATED ONTO INDIVIDUAL FMEAS.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-196 03-2F-131	310-1			ASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	196	BIPROP S	OLENO	ID VLV	, VERNI	ERS, ALL AXES
LEAD ANALYST:	C.D. PRUS	T	-			
ASSESSMENT:						
CRITICAL FLIGH	ITY R	EDUNDANC	Y SCRI	EENS		CIL ITEM
HDW/FU			В	С	-,	
NASA [2 /2 IOA [1 /1] [] []	[]	[X] * [X]
COMPARE [N /N] [] []	[]	[]
RECOMMENDATIONS:	(If dif	ferent f	rom N	ASA)		
[/] [] []	[[] DD/DELETE)
* CIL RETENTION	RATIONALE:	(If app	licab	ΔΓ	EQUATE	[]
REMARKS: IOA WITHDRAWS 1/ FLOW TO A THRUST VERNIER THRUSTER ASSIGNMENT. IOA RECOMMENDS T	ER COULD R STANDPOIN	ESULT IN T, IOA A	BURN- GREES	ONCERN -THROU WITH	I THAT RI IGH. FRO THE NAS	ESTRICTED OM A LOSS OF A/RI 2/2
BE SEPARATED ONT	O INDIVIDU	AL FMEAS				

ASSESSME ASSESSME NASA FME	NT	ID:	PCG-		312 -	1		ì		DATA: LINE (NEW (]	
SUBSYSTE MDAC ID: ITEM: PRIMARY,		L AXE			COMB	USTIC	ON CH	IAMBEI	ROR	ŅOZZLE	E:	XTENS	ION
LEAD ANA	LYS	T:	C.D.	PRUS	T								
ASSESSME	NT:												
CRITICALITY REDUNDANCY				SCR	SCREENS				CIL ITEM				
		FLIGH DW/FU	NC	A		E	3	C	2	1	. 11 6.	M	
NASA IOA]	1 /1 1 /1]	[]	[]	[]]	X] *	
COMPARE	[/]	[]	[]	[]	. []	
RECOMMEN	DAT	ions:	(1	f dif	fere	nt fr	om N	IASA)					
	Ţ	/]	[]	[]	· []] I QA))/D:] ELETE)
* CIL RE	TEN	TION	RATIO	NALE:	(If	appl	icab	1	ADEQU ADEQU]	
REMARKS:							AT TH	E FA	LURE	MODES	0	N THI	s

ASSESSMENT DA' ASSESSMENT ID NASA FMEA #:			1			SA DATA: ASELINE NEW	[x]	
SUBSYSTEM: MDAC ID: ITEM: PRIMARY, ALL	197 THRUS	TER COMBI	USTIO	N CHA	MBER	OR NOZZI	LE 1	EXTI	ENSION,
LEAD ANALYST:	C.D. I	PRUST							
ASSESSMENT:									
	CALITY IGHT	REDUN	DANCY	SCRE	ENS		CII		
	/FUNC	A	В		С		111	21.1	
NASA [1 ,	/1] /1]	[]	[]	[]	[]	x] x]	*
COMPARE [/]	ן ז	[]	[]	[]	
RECOMMENDATION	NS: (If	differe	nt fr	om NA	SA)				
[,	/]	[]	{]	[] (AI	[DD/1	DELI	ETE)
* CIL RETENTION	ON RATIONA	ALE: (If	appl	icabl	AD	EQUATE EQUATE	[]	
REMARKS: NO DIFFERENCE: FMEA INCLUDE SUBASSEMBLY INDIVIDUAL FM	"STRUCTURA TEMS INCL	AL FAILU	RE".	IOA	ALSO	RECOMMEN	1DS	TH	THIS AT THE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-198 03-2F-13	1310-4		NASA I BASEI	DATA: LINE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM: VERNIER, ALL AXE		COMBUS	STION CHA	MBER OR N	OZZLE EXTENSION
LEAD ANALYST:	C.D. PRU	ST			
ASSESSMENT:					
CRITICAI FLIGH		REDUND	ANCY SCRE	ENS	CIL ITEM
HDW/FU		A	В	С	LIEM
NASA [1 /1 IOA [1 /1] []	[]	[]	[X] * [X]
COMPARE [/] []	[]	[]	[]
RECOMMENDATIONS:	(If di	fferen	t from NA	SA)	
[/] []	[]	[]	[] (ADD/DELETE)
* CIL RETENTION	RATIONALE	: (If a	applicabl	.e) ADEQUA INADEQUA	
REMARKS: NO DIFFERENCES. FMEA INCLUDE "ST RECOMMENDS THAT SEPARATED ONTO I	RUCTURAL THE SUBAS	FAILURI SEMBLY	E" AND "E ITEMS IN	FAILURE BURN-THROU	MODES ON THIS JGH". IOA ALSO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-199	•				
SUBSYSTEM: MDAC ID: ITEM:	ARCS 199 HELIUM ST	ORAGE T	TANK	•••		
LEAD ANALYST:	C.D. PRUS	Г				
ASSESSMENT:						
CRITICALITY REDUNDANCY S FLIGHT				ens	CIL ITEM	
HDW/FU			В	C	IIEM	
NASA [1 /1 IOA [1 /1] [] []	[]	[X] *	
COMPARE [/] [] []	[]	[]	
RECOMMENDATIONS:	(If dif	ferent	from NAS	SA)		
[/] [] []	[] (A	[] DD/DELETE)	
* CIL RETENTION 1	RATIONALE:	(If ap	plicable	adequate INADEQUATE	[] / -	
REMARKS: NO DIFFERENCES. ABOUT POSSIBLE VI	COLATIONS (OF ORBI	TER ENTI	RY MASS PROP	O THE EFFECTS ERTIES	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	•		NE [] NEW [X]
MDAC ID:	ARCS 200 HELIUM FILL COUP		
LEAD ANALYST:	C.D. PRUST	2.9514-77	
ASSESSMENT:			
CRITICALI FLIGHT	ITY REDUNDAN	CY SCREENS	CIL ITEM
	NC A	в с	
NASA [2 /1R IOA [2 /1R] [F] [] [P] [F] [P] NA] [P]	[X] *
COMPARE [/] [и] [и] []	[]
RECOMMENDATIONS:	(If different	from NASA)	
[2 /1R] [F] [F] [P]	[A] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If app		nva r 3
		ADEQUAT INADEQUAT	re []
RECOMMENDS THAT THIS FMEA. THIS	NASA/RI FAILURE O "POPPET FAILS OPE IS A CREDIBLE FA THE SSM AGREED W	F A AND B SCREENS N" BE ADDED AS A ILURE MODE AND IS	S. IOA FAILURE MODE ON S ADDRESSED ON

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DOC 201	070-2		NASA DATA BASELINE NEW				
MDAC ID:	ARCS 201 HELIUM FI	LL COUPLI	NG					
LEAD ANALYST:	C.D. PRUS	C.D. PRUST						
ASSESSMENT:								
CRITICALITY REDUNDANCY S FLIGHT				5	CIL ITEM			
	NC A	В		C	1126	•		
NASA [3 /3 IOA [3 /3] [] [] []	[] *		
COMPARE [/] [) [] [1	[]		
RECOMMENDATIONS:	(If dif	ferent fro	om NASA))		-		
[3 /3] [] [] [[DD/DE] LETE)		
* CIL RETENTION	RATIONALE:	(If appl:	·	ADEQUATE NADEQUATE	[]		
REMARKS: IOA FAILURE MODE: COUPLE" AND "RES'	TRICTED FLO	OW". IOA	RECOMME	ENDS THAT '	'RESI	RICTED		
FLOW" BE ADDED AS CREDIBLE FAILURE THE SSM AGREED W	MODE AND	IS ADDRESS	SED ON C					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-202	01020-2		NASA DATA BASELINE NEW				
MDAC ID:	ARCS 202 HE ISOL	A & B VL	vs					
LEAD ANALYST:	C.D. PRO	UST						
ASSESSMENT:								
CRITICAL: FLIGHT		REDUNDAN	CY SCREEN	s	CIL ITEM			
HDW/FUI		A	В	С				
NASA [3 /1R IOA [3 /1R] [P] [P] [P] [P] [P] P]	[] *			
COMPARE [/] [] [] []				
RECOMMENDATIONS:	(If d	ifferent	from NASA)				
[3 /1R] [P] [F] [[A] DD/DELETE)			
* CIL RETENTION	* CIL RETENTION RATIONALE: (If applicable) ADEQUATE []							
REMARKS: IOA NOW RECOMMENT AND FAILURE MODE SECONDARY REG IS	BE ADDE	D TO THE	REEN BE FA	AILURE OF '	HAT THIS ITEM			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-202	A		NASA DATA BASELINE NEW		
SUBSYSTEM: MDAC ID: ITEM:	ARCS 202 HE ISOL	A & B 7	/LVS			
LEAD ANALYST:	C.D. PRU	JST				
ASSESSMENT:						
CRITICALITY REDUNDANCY SCREENS FLIGHT				CIL ITEM		
	NC	A	В	С	IIIM	
NASA [/ IOA [3 /1R						*
COMPARE [N /N] [n]	[N]	[N]	[]	
RECOMMENDATIONS:	(If di	fferent	from NA	SA)		
[3 /1R] [P]	[F]		[A] DD/DELI	
* CIL RETENTION 1	RATIONALE	E: (If a	applicable	e) ADEQUATE INADEQUATE	[]	
REMARKS: NASA/RI DO NOT CO SSM AGREED THAT TO 201020-2, WHICH I A 3/1R PFP FOR 00	THIS FAII IS CLASSI	TURE MOI	DE SHOULD A 3/1R	INTERNAL LEAD BE ADDED TO PPP. IOA NOV	KAGE). 03-2A: W RECOM	THE - MMENDS

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DOC 202			NASA DAT BASELII NI	
MDAC ID:	ARCS 203 HE ISOL A	& B VL	/S		
LEAD ANALYST:	C.D. PRUS	T			
ASSESSMENT:					
FLIGH	ITY R		CY SCRE	ENS C	CIL ITEM
·	•				-
NASA [2 /1R IOA [2 /1R] [P] [P] [P] NA]	[P] [P]	[X] * [X]
COMPARE [/	1 (] [n j	[]	[]
RECOMMENDATIONS:	(If dif	ferent i	from NA	SA)	
[/] [] [] .	[.]	[] (ADD/DELETE)
* CIL RETENTION	RATIONALE:	(If apr	olicable	e)	
		`		ADEQUATI	E [] E []
REMARKS: IOA AGREES WITH ADDING A STATEME ORBITER ENTRY MA	NT TO THE SS PROPERT	EFFECTS IES CONS	ABOUT	POSSIBLE V	IOLATIONS OF

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-204	01013-1				SA DATA ASELINE NEW	[]
	ARCS 204 HE LINE	, ALL E	XCEP'	r Iso	r ara	TO PRE	ss	RE	GULATOR
LEAD ANALYST:	C.D. PR	UST							
ASSESSMENT:									
CRITICAL FLIGH		REDUND	ANCY	SCRE	ens			IL FEM	
HDW/FU	_	A	В		С				
NASA [1 /1 TOA [1 /1] []	[]	[]	[X X] *]
COMPARE [/] []	[]	[]	[]
RECOMMENDATIONS:	(If d	ifferen	t fr	om NAS	SA)				
[/] []	ι.]	[] (A)	-	/DE] LETE)
* CIL RETENTION	RATIONAL	E: (If	appl:	icable	AD	EQUATE EQUATE]
REMARKS: NO DIFFERENCES.	IOA REC	OMMENDS	ADD:	ING A	STAT	EMENT TO	0_5	ГНЕ	EFFECTS

ABOUT POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND/OR PROP TANK LANDING WEIGHT CONSTRAINTS. THIS FMEA SHOULD ALSO INCLUDE HELIUM COMPONENT BODIES IN THE ITEM LIST AND CORRESPONDING RETENTION RATIONALE. THE SSM AGREED THAT VALVE BODIES SHOULD BE ADDED.

THE WITTER OF THE STATE OF THE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-205 NONE		BASI	ELINE [] NEW []							
SUBSYSTEM: MDAC ID: ITEM:	205	, ALL EXCE	PT ISOL VLV TO	O PRESS REGULATOR							
LEAD ANALYST:	C.D. PRU	JST									
ASSESSMENT:											
CRITICAL FLIGH	ITY T	REDUNDANCY	SCREENS	CIL ITEM							
HDW/FU	NC	A F	3 C	3. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.							
NASA [/ IOA [1 /1] [.] [] []	[] * [X]							
COMPARE [N /N] . [] [1	і] [и]	[N]							
RECOMMENDATIONS:	(If di	ifferent fr	com NASA)								
[/] [] [] []	[] (ADD/DELETE)							
* CIL RETENTION	RATIONALE	E: (If app)		UATE [] UATE []							
REMARKS: NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 1/1 EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/01/88 RCS-206 03-2A-20	01013-1		NASA DATA: BASELINE NEW	
MDAC ID:	206			S REGULATOR	₹
LEAD ANALYST:	C.D. PRU	JST			
ASSESSMENT:					
		REDUNDAN	CY SCREEN	S	CIL
FLIGH HDW/FU	T NC	A ·	В	С	ITEM
NASA [1 /1 IOA [2 /1R] [P] [P] [P]	[X] *
COMPARE [N /N] [и][и] [N]	[]
RECOMMENDATIONS:	(If di	fferent	from NASA)	
[/] [] [] [] (AI	[] DD/DELETE)
* CIL RETENTION	RATIONALE	E: (If ap		ADEQUATE NADEQUATE	[]
REMARKS: IOA ORIGINALLY C	ONSIDEREI	THE PAR	ALLEL LIN	E SEGMENTS	OF THE ISOL
VLV LEGS TO BE R	EDUNDANT.	HOWEVE	R, IOA AG	REES WITH T	THE NASA/RI
CRIT 1/1 ASSIGNM TO THE EFFECTS R					
MASS PROPERTIES	CONSTRAIN	ITS AND P	ROP TANK	LANDING WEI	GHT
CONSTRAINTS. TH	IS FMEA S	HOULD AL	SO INCLUD	E HELIUM CO	MPONENT
BODIES IN THE IT	em LIST ?	AND CORRE	SPONDING :	KETENTION F	KATIONALE.

THE SSM AGREED THAT VALVE BODIES SHOULD BE ADDED.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-207		-	NASA DATA: BASELINE NEW						
	ARCS 207 HE LINE,	ISOL VL	V TO PRES	SS REGULATOI	₹.					
LEAD ANALYST:	C.D. PRUS									
ASSESSMENT:										
FT.TGH	ITY R T NC A		CY SCREE	ns C	CIL ITEM					
NASA [/ IOA [2 /1R] [] [P] [p]	[] [P]	[X]					
COMPARE [N /N] [N] [N]	[N]	[· N]					
RECOMMENDATIONS:	(If dif	ferent :	from NAS	A)						
, , , , , , , , , , , , , , , , , , ,] [] []	[] (Al	[] DD/DELETE)					
* CIL RETENTION		(If ap	plicable) ADEQUATE INADEQUATE	[]					
ADEQUATE [] INADEQUATE [] REMARKS: NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULT RESULT IN 2/1R EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.										

NASA DATA:

ASSESSMENT DATE: 1/01/88

ASSESSMENT ID: NASA FMEA #:	RCS-208 03-2A-201091-	1,	BASELINE NEW	[x]
SUBSYSTEM: MDAC ID: ITEM:	ARCS 208 HIGH PRESSURE	HELIUM TEST	PORT COUPI	LINGS A & B
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAL: FLIGHT	TY REDUN	DANCY SCREEN	S ·	CIL ITEM
HDW/FUI		В	С	TICH
NASA [3 /1R IOA [3 /1R] [F]	[F] [[NA] [P] P]	[X] * []
COMPARE [/] [N]	[N] [].	[N]
RECOMMENDATIONS:	(If differe	nt from NASA)	
. [3 /1R] [F]	[F] [P] (AI	[A] DD/DELETE)
* CIL RETENTION H	RATIONALE: (If		ADEQUATE NADEQUATE	
REMARKS: IOA AGREES WITH I IOA RECOMMENDS THE MODE ON THIS FMEA ADDRESSED ON 03-2 IOA ALSO RECOMMEN POSSIBLE VIOLATIC AND PROP TANK LAN FMEA IS INCORRECT	HAT "POPPET FA A. THIS IS A 2F-101070-1. VDS ADDING A S DNS OF ORBITER VDING WEIGHT C	ILS OPEN" BE CREDIBLE FAI THE SSM AGRE TATEMENT TO ENTRY MASS	ADDED AS A LURE MODE A ED WITH THE THE EFFECTS PROPERTIES	A FAILURE AND IS E IOA ISSUE. E REGARDING CONSTRAINTS

i	ASSESSMI ASSESSMI NASA FMI	ENT	ID):	RCS-	209	2			SELINE NEW		[]			
1	SUBSYSTI MDAC ID: ITEM:				ARCS 209 HIGH	PRES	SURE	HELIU	M TES	T POR	T COUP	LING	s A	. &	В
	LEAD AN	ALYS	ST:	;	C.D.	PRUS'	T								
	ASSESSMI	ENT:	:												
		CRI		CAL LIGH	ITY T	R	EDUNI	DANCY	SCREE	ns		CII			
		F	IDW	V/FU	NC	A		В		С			•		
	NASA IOA]	3 3	/3 /3]	[]	[]	[]		[]	*	
	COMPARE	[/]	[]	[]	[]		[]		
	RECOMME	NDAT	ric	ons:	(I	f dif	fere	nt fro	m NAS	A)		ŧ .			
	g - Marie - 1	[3	/3]	[]	C .]	[]	(2	[ADD/I] DELF	ETE))
	* CIL R	ETEI	(TI	ON	RATIO	NALE:	(If	appli	cable	ADE	QUATE]		
	REMARKS IOA FAI COUPLE" FLOW" BI CREDIBLE THE SSM	LURI ANI E AI E F	' D DDI AII	'RES ED A LURE	TRICT S A F MODE	ED FL AILUR AND	OW". E MO IS A	IOA DE ON DDRESS	RECOM THIS	D INC MENDS FMEA.	LUDE 'S THAT	'FAII "RES	STRI A	ro [CT]	ΞŒ

ASSESSMENT DA ASSESSMENT ID NASA FMEA #:				NASA DATA: BASELINE NEW						
SUBSYSTEM: MDAC ID: ITEM:	ARCS 210 HELIUM	PRESSURE	REGULATOR	ASSEMBLY						
LEAD ANALYST:	C.D. PR	C.D. PRUST								
ASSESSMENT:										
	CALITY LIGHT	REDUNDAN	CY SCREEN	S	CIL ITEM					
	/FUNC	A	В	C	:					
NASA [3 IOA [3	/1R] [/1R] [P] [P] [F] [NA] [P] P]	[X] *					
COMPARE [/] [] [и] []	[N]					
RECOMMENDATIO	NS: (If d	ifferent	from NASA)						
[/] [] [] [[] DD/DELETE)					
* CIL RETENTI	ON RATIONAL	E: (If ap	plicable)	100001000						
			I	ADEQUATE NADEQUATE	[]					
REMARKS: IOA AGREES WI RECOMMENDS AD VIOLATIONS OF	DING A STAT CORBITER EN	EMENT TO TRY MASS	THE EFFECT	rs regardin	G POSSIBLE					
TANK LANDING	WEIGHT CONS	TRAINTS.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-211 03-2A-201030-2	NASA DATA BASELINI NEV								
SUBSYSTEM: MDAC ID:	ARCS 211	REGULATOR ASSEMBLY								
LEAD ANALYST:	C.D. PRUST	C.D. PRUST								
ASSESSMENT:										
CRITICAL FLIGH		NCY SCREENS	CIL ITEM							
HDW/FU		В С	11211							
NASA [2 /1R IOA [2 /1R	[P] [P]	[P] [F] [NA] [P]	[X] * [X]							
COMPARE [/] . []	[N] [N]	[]							
RECOMMENDATIONS:	(If different	from NASA)								
[2 /1R	[P]		[ADD/DELETE)							
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE []										
INADEQUATE [] REMARKS: IOA AGREES WITH NASA/RI FAILURE OF C SCREEN. HOWEVER, IOA RECOMMENDS THAT THE B SCREEN BE FAILED. A FAILED CLOSED REG WOULD NOT BE DETECTABLE DURING DUAL LEG OPERATION (ASCENT). IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT CONSTRAINTS.										

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-212 03-2A-201030-	NASA BAS -2	A DATA: SELINE [] NEW [X]						
SUBSYSTEM: MDAC ID: ITEM:	212	JRE REGULATOR ASSI							
LEAD ANALYST:	C.D. PRUST	C.D. PRUST							
ASSESSMENT:									
		NDANCY SCREENS	CIL ITEM						
FLIGH HDW/FU	NC A	в с	TIEM						
NASA [2 /1R IOA [2 /1R] [P]] [P]	[P] [F] [NA]	[X] * [X]						
COMPARE [· /] []	[и] [и]	[]						
RECOMMENDATIONS:	(If differe	ent from NASA)							
[2 /1R] [P]	[F] [F]	[] (ADD/DELETE)						
* CIL RETENTION	RATIONALE: (If								
		ADEÇ INADEÇ	QUATE [] QUATE []						
REMARKS: IOA AGREES WITH NASA/RI FAILURE OF C SCREEN. HOWEVER, IOA RECOMMENDS THAT THE B SCREEN BE FAILED. A FAILED CLOSED REG WOULD NOT BE DETECTABLE DURING DUAL LEG OPERATION (ASCENT). IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS									
POSSIBLE VIOLATI	ONS OF ORBITER	CENTRY MASS PROPE	RTIES CONSTRAINTS						

AND PROP TANK LANDING WEIGHT CONSTRAINTS.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-213			NASA DATA: BASELINE NEW	[]				
	ARCS 213 HELIUM PR	RESSURE R	EGULATOR	ASSEMBLY					
LEAD ANALYST:	C.D. PRUS	T							
ASSESSMENT:									
CRITICAL FLIGH HDW/FU			Y SCREENS	5 C	CIL ITEM				
·	•			1	ſ] *				
IOA [2 /1R] [F	ין נֹי	P] [Pj	[X] *				
COMPARE [N /N] []	[]	и] [N]	[и]				
RECOMMENDATIONS:	(If dif	ferent f	rom NASA)					
[1 /1	1] [] [] (Ar	[A] DD/DELETE)				
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []									
REMARKS: NASA/RI DO NOT COVER THIS FAILURE MODE (EXTERNAL LEAKAGE). THE SSM AGREED THAT THIS VALVE BODY SHOULD BE ADDED TO THE HELIUM									
LINE EXTERNAL LE RETENTION RATION	AKAGE FMEA								
IOA ORIGINALLY C REDUNDANT FOR TH FAILURE AS A 1/1	ONSIDERED	THE PARA (2/1R),	LLEL HELE BUT NOW	IUM FLOW PA CLASSIFIES	THS TO BE				

1/01/88 RCS-214 NONE	NASA DATA: BASELINE [] NEW []
ARCS 214 HELIUM PRESSURE REGULATOR	PRIMARY SENSING PORT
C.D. PRUST	
TY REDUNDANCY SCREENS	CIL I TEM
C A B	C
] [] [] [] [P] [[] * P] [X]
] [и] [и] [и] [и]
(If different from NASA)	
] [P] [F] [P] [A] (ADD/DELETE)
ATIONALE: (If applicable)	
	ADEQUATE [] ADEQUATE []
OVER THIS FAILURE MODE (EXT COWEVER, THIS FAILURE MODE TEM ON FMEA 03-3-1004-3 (3) THIS FAILURE MODE ALSO BE COME THE SAME RATIONALE USED IN O	/2R PFP). IOA OVERED FOR THE RCS
	RCS-214 NONE ARCS 214 HELIUM PRESSURE REGULATOR C.D. PRUST TY REDUNDANCY SCREENS C A B [

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: RCS-215 NASA FMEA #: NONE																ASA D BASEL		Г]	
SUBSYSTEM: ARCS MDAC ID: 215 ITEM: HELIUM				4	PRI	essui	RE	R	ŒΘ	JUI	_ATC	R	PI	RIMAR	y s	ENS	SIN	IG	PORT		
LEAD ANA	LY:	ST	:	c.	.D. PRUST																
ASSESSMENT:																					
		F	ICAL LIGH	T				EDUNI	DAI	1C	Y	sc	REE	ENS	s				CIL ITEM		
	1	HDI	W/FU	NC			A				В				С						
NASA IOA	[2	/ /1R]		[P]		[P]		[P]]	x]	*,
COMPARE	[N	/N]		[N]		[N]		[N]		[N]	
RECOMMEN	'DA'	rI(ons:		(If	đ.	if	fere	nt	f	ro	om	NAS	A)						
	[/]		[]		[]		[]	(A		/DI		ETE)
* CIL RE	TE	NT:	ION :	RAT	CION	AL:	E:	(If	a	qç	11	Lca	able	≥)							
								y to eff	TT				,4.]	IJ	IA. IAV	DEQUA DEQUA	TE TE	[]	
INADEQUATE [] REMARKS: THIS FAILURE MODE (BLOCKAGE OF SENSING PORT) IS ADEQUATELY ADDRESSED ON FMEAS 03-2A-201030-1 AND 201030-2, WHICH LIST CONTAMINATION OF PILOT FILTERS, RESTRICTOR ORIFICES, AND SENSE PORTS AS CAUSES FOR THE REGULATOR FAILURES COVERED. AN ADDITIONAL FMEA IS UNNECESSARY.																					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-216	1		: [
	ARCS 216 HELIUM PRESSU									
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:	ASSESSMENT:									
CRITICAL FLIGH	ITY REDUN	DANCY SCREEN	s	CIL ITEM						
	NC A	В	С	IICM						
NASA [3 /1R IOA [2 /1R] [F]] [P]	[F] [[NA] [P] P]	[X] *						
COMPARE [N /] [N]	[N] []	[]						
RECOMMENDATIONS:	(If differe	nt from NASA	.)							
[3 /1R] [F]	[F] [[A] DD/DELETE)						
* CIL RETENTION	RATIONALE: (If		ADEQUATE							

ASSESSME ASSESSME NASA FME	NT ID:		RCS-217 BASELINE [
SUBSYSTE MDAC ID: ITEM: COUPLING		ARCS 217								ORT	
LEAD ANA	LYST:	C.D. P	RUSI	?							
ASSESSME	NT:										
	CRITICAL FLIGH		RE	EDUNDA	NCY	SCREE	ens		CII ITE		
	HDW/FU	NC	A		В		С				
NASA IOA	• /]	[]	[]	[]	[]	*
COMPARE	[/]	[]	[]	[]	[,]	
RECOMMEN	DATIONS:	(If	diff	erent	fro	om NAS	SA)				
	[3 /3]	[]	[]	[]	(ADD/D		TE)
* CIL RE	TENTION	RATIONA	LE:	(If a	ippli	cable	A	DEQUAT DEQUAT]	
REMARKS: IOA FAIL COUPLE" FLOW" BE CREDIBLE	AND "RES ADDED A	TRICTED S A FAI	FLC	OW". E MODE	IOA	RECONTHIS	IMEN FME	DS THA A. TH	T "RES	TRI A	
THE SSM						JD OF	. 01	THE YE	LILLAU	•	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-218	95-1	NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	ARCS 218	VALVE ASSEMBLY	e e de	
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAL: FLIGH HDW/FU	ľ	OUNDANCY SCREENS B	c c	CIL ITEM
NASA [3 /3 IOA [2 /1R] [p]	[F] [P]	[x] *
COMPARE [N /N] [N]	[N] [N]	[N]
RECOMMENDATIONS:	(If diffe	erent from NASA))	
[2 /1R] [P]	[F] [P] (AD	[A] DD/DELETE)
* CIL RETENTION	RATIONALE: (ADEQUATE NADEQUATE	
REMARKS: IOA RECOMMENDS T	HAT THIS ITE	M AND FAILURE N	MODE BE UPO	RADED TO A
2/1R PFP AND PLA	CED ON THE C	IL. WITH SERIE	ES POPPETS	FAILED OPEN,
THE CONTAMINATION COULD RESULT IN	LOSS OF PROP	TANK REPRESS O	CAPABILITY	AND
INABILITY TO USE	OR DEPLETE	ARCS PROP. THI	S COULD RE	ESULT IN LOSS
OF ET SEP CONTROL OF ENTRY MASS PRO	L, LOSS OF E OPERTIES CON	NTRY CONTROL, A	AND POSSIBI ROP TANK LA	LE VIOLATIONS ANDING WEIGHT
The state of the s				

CONSTRAINTS. FAILURE OF ONE POPPET IS UNDETECTABLE

DURING FLIGHT.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-219	1/01/88 NAS RCS-219 BA 03-2A-201095-2							
MDAC ID:	ARCS 219 QUAD CHECK VA								
LEAD ANALYST: C.D. PRUST									
ASSESSMENT:									
CRITICAL FLIGH HDW/FU	_	DANCY SCR	EENS C	CIL ITEM					
·		(F)							
IOA [2 /1R	[P] [P]	[F]	[P]	[X] * [X]					
COMPARE [/] []	[]	[N]	[]					
RECOMMENDATIONS:	(If differe	nt from N	ASA)						
. [,,/] []	[]	[] (A	[] DD/DELETE)					
* CIL RETENTION	RATIONALE: (If	applicab	le)						
			ADEQUATE INADEQUATE						
REMARKS: IOA AGREES WITH ADDING A STATEME OF ORBITER ENTRY LANDING WEIGHT C	NT TO THE EFFE MASS PROPERTI	CTS REGAR	DING POSSIBLE	VIOLATIONS					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-220 03-2A-201091-1	NASA DATA: BASELINE NEW	
OODOIDIMI.	ARCS 220 QUAD CHECK VALVE TEST I	PORT COUPLINGS	5 A & B
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
r Lilen.			CIL ITEM
HDW/FU	NC A B	С	
NASA [3 /1R IOA [3 /1R] [F] [F]] [NA]	[P] [P]	[X] *
COMPARE [/] [N] [N]	[] .	[N]
RECOMMENDATIONS:	(If different from NA	ASA)	
[3 /1R] [F] [F]	[P] (AE	[A] D/DELETE)
	RATIONALE: (If applicabl	Le) ADEQUATE INADEQUATE	
RECOMMENDS THAT THIS FMEA. THIS 03-2F-101070-1. RECOMMENDS ADDING VIOLATIONS OF EN	NASA/RI FAILURE OF A AND POPPET FAILS OPEN BE A IS A CREDIBLE FAILURE NOTHER SEM AGREED WITH THE GA STATEMENT TO THE EFFORM TO THE EFFORM TO THE SEMENT TO THE QUANTITY OF THE	ADDED AS A FAI MODE AND IS AD E IOA ISSUE. FECTS ABOUT PO STRAINTS AND P	LURE MODE ON DRESSED ON IOA ALSO SSIBLE PROP TANK

ASSESSME ASSESSME NASA FME	ENT	I		1/01/88 RCS-221 03-2A-201091-2								DATA ELINE NEW	[,] ,]		
SUBSYSTE MDAC ID:				22		СНЕС	K VAI	LVE T	EST	PORT	COUE	PLING	s a	& :	В	
LEAD ANA	LY	ST	:	C.	C.D. PRUST											
ASSESSME	:															
	CR		ICAL LIGH		7	R	EDUNI	ANCY	sci	REENS		** ***	CII	_		
	!		W/FU			A			ВС				***	21.1		
NASA IOA	[[3 3	/3 /3]		[]	[]	[]		[]	*	•
COMPARE	[/]		[]	[]	[]		[1		
RECOMMEN	IDA'	ΤI	ons:		(If	dif	ferer	nt fr	om 1	NASA)						
	[3	/3]		[]	[]	(]	(A)	[DD/I) DEL	ETE)	
* CIL RE		NT	ION	RAT	CION	ALE:	(Îf	appl:	ical	À		JATE JATE	[]		
REMARKS: IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS TO COUPLE" AND "RESTRICTED FLOW". IOA RECOMMENDS THAT "RESTRICTED FLOW" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON OTHER QD FMEAS. THE SSM AGREED WITH THE IOA ISSUE.																

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-222	1110-1				SA DATA BASELINE NEW]		
SUBSYSTEM: MDAC ID: ITEM:	ARCS 222 PROPELLA									
LEAD ANALYST:	C.D. PRU	ST								
ASSESSMENT:										
CRITICAL FLIGH		REDUND	ANCY	SCREE	ns		CIL ITEM			
		A	В		C					
NASA [1 /1 IOA [1 /1] []]]	[]	[X] *		
COMPARE [/]]	[]	[]	[1		
RECOMMENDATIONS:	(If di	fferen	t fro	om NAS	SA)					
[/] [3	[]	[] (A	[DD/DI] ELETE)		
* CIL RETENTION	RATIONALE	: (If	appl:	icable	AI	DEQUATE DEQUATE	[]		
REMARKS: NO DIFFERENCES. EFFECTS OF PROP EVA AND GROUND C	LEAKAGE (CORROS	IVE,	THE FIRE/	EFFI	ECTS DIS	CUSS EXPOS	THE SURE OF		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-223 03-2A-202108-1	NASA DATA: BASELINE [] NEW [X]							
	ARCS 223 PROP LINES, ALL								
LEAD ANALYST:	C.D. PRUST								
ASSESSMENT:									
FLIGH	REDUNDANCY SCRE	ENS CIL ITEM C							
NASA [1 /1 IOA [1 /1									
COMPARE [/] .[] []	[]							
RECOMMENDATIONS:	(If different from NA	SA)							
Ţ/] [] []	[] [] (ADD/DELETE)							
* CIL RETENTION	RATIONALE: (If applicabl	e) ADEQUATE [] INADEQUATE []							
AS A CAUSE ON TH FAILURE WHICH SH SHOULD INCLUDE V CORRESPONDING RE	IIS FMEA/CIL. IOA CONSID IOULD BE ADDRESSED ON THE VALVE BODIES IN THE ITEM THENTON RATIONALE. IOA THE POSSIBLE EXPOSURE OF	LOWS TO DEFLECT" BE ADDED ERS THIS TO BE A CREDIBLE FMEA/CIL. THIS FMEA							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-224				ATA: INE [] NEW []
	ARCS 224 PROP LINE	S, ALL		- · ·- ·	
LEAD ANALYST:	C.D. PRUS	ST		-	-
ASSESSMENT:					
	JITY R	REDUNDANC	Y SCREEN	ıs	CIL
FLIGH HDW/FU	it inc a		В	С	ITEM
NASA [/ IOA [1 /1] [] [] []	[x] *
COMPARE [N /N] [] [] []	[N]
RECOMMENDATIONS:	(If dif	ferent f	rom NASA	۲)	
[/] [] [] []	[] (ADD/DELETE)
* CIL RETENTION	RATIONALE:	(If app	·	ADFOITA	TE [] TE []
REMARKS:					,
NASA/RI DO NOT C	OVER RESTR	CICTED FL	OW IN A	SEGMENT	OF LINE DUE TO
OBSTRUCTION OR I	EFORMATION	(CRIMPI	NG). SU	CH AN O	CCURRENCE COULD
RESULT IN 1/1 EF					
OCCURRENCE IS QUE DOWNSTREAM FILTE					
FAILURE BE ADDRE					

RECOMMENDATION AS AN OPEN ISSUE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	: [
SUBSYSTEM: MDAC ID: ITEM:	ARCS 225									
LEAD ANALYST:	C.D. PRUST									
ASSESSMENT:										
CRITICAL FLIGH	CIL ITEM									
HDW/FU		В	C	TIDM						
NASA [2 /1R IOA [2 /1R] [F]	[F] [[NA] [P] P]	[X] *						
COMPARE [/] [N]	[и]	1	[]						
RECOMMENDATIONS:	(If differ	ent from NASA)							
[/	1 []	.] [] (A)	[] DD/DELETE)						
* CIL RETENTION	RATIONALE: (ADEQUATE NADEQUATE							
REMARKS: IOA AGREES WITH NASA/RI RATIONALE FOR FAILURE OF A AND B SCREENS. IOA RECOMMENDS ADDING A STATEMENT TO THE EFFECTS REGARDING POSSIBLE VIOLATIONS OF ORBITER ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT CONSTRAINTS.										

ASSESSME ASSESSME NASA FME	NT	I	D:	RCS-2	26	150-2				ASA DATA BASELINE NEW]	
SUBSYSTE MDAC ID: ITEM:	M:			ARCS 226 PROP FILL/VENT COUPLING									
LEAD ANA	LY	ST	:	C.D.	C.D. PRUST								
ASSESSME	NT	:											
	CR:		ICAL LIGH	ITY	R	EDUND.	ANCY	SCREE	ENS		CIL		
]	_		NC	A		В		С				
NASA IOA	[3	/3 /3]	[]	[]	[]	[] *	t
COMPARE	[/	1	[]	[]	[]	[]	
RECOMMEN	DA'	ΓI	ons:	(If	dif	feren	t fro	om NAS	SA)				
	[3	/3]	[.]	[]	[[ADD/D		E)
* CIL RE	TE	NT:	ION :	RATION	ALE:	(If	appl	icable		DEQUATE	r	٦	
										DEQUATE	[]	
REMARKS: IOA FAIL COUPLE" FLOW" BE CREDIBLE THE SSM	UR AN A	D DD AI	"RES ED A LURE	TRICTE S A FA MODE	D FL ILUR AND	OW". E MOD IS AD	IOA E ON DRESS	RECONTHIS	IMENI FME	DS THAT A. THIS	"RES	TRIC A	
TUE SOM	AG.	Ç.	۳ لايد	TIN IU	L LO	W TOO	٠ بد ب						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-227								
MDAC ID:	ARCS 227 PROP CHANNEL	SCREENS							
LEAD ANALYST:	C.D. PRUST	C.D. PRUST							
ASSESSMENT:									
CRITICAL FLIGH	ITY REDUN	DANCY SCR	REENS	CIL					
HDW/FU	_	В	С	· ·					
NASA [1 /1 IOA [1 /1		[]	[]	[X] *					
COMPARE [/] []	[]	[]	[]					
RECOMMENDATIONS:	(If differe	nt from N	IASA)						
[/] []	[]	[] (2	[] ADD/DELETE)					
* CIL RETENTION	RATIONALE: (If	applicab	ole) ADEQUATE INADEQUATE						
REMARKS: IOA RECOMMENDS TO SHOW SPECIFIC AGREED WITH THE	HE ITEM LIST OF ALLY WHAT IS C	R FUNCTIO	TS INCLUDED O	ON THIS FMEA					

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ASSESSME ASSESSME NASA FME	NT	II):	RCS-2						ASA DATA BASELINE NEW]	
SUBSYSTEMDAC ID:	M:			ARCS 228 PROP	FEEDO	יד דטכ	JBE			istis			wa ura
LEAD ANA	:	C.D.	PRUS	r				r .					
ASSESSME	NT:										= 0 15 1		
			CAL: LIGH	[TY	RI	EDUND	ANCY	SCREI	ens		CIL		
				NC	A		В		С	•	* * **	•	
NASA IOA	[1	/1]	[]	[]	[]	[x]	*
COMPARE	[N	/N	1	(]	(]	[]	[N]	
RECOMMEN	DAT	'IC	ONS:	(If	dif	feren	t fro	om NAS	SA)				
. g 	[/]	[,]	[]	[] (A)	[DD/DI		
* CIL RE	TEN	T	ON I	RATION	ALE:	(If a	appli	icable			_	_	
		-							INA	DEQUATE DEQUATE	[]	
REMARKS: NASA/RI NOW CONS QUESTION MODE IN THIS FAI	IDE ABI THE	RS E	RE: IO	STRICT DA DOE: /CIL TO	ED FI S NOT D BE	LOW II I REGA AN O	N_THI	IS SEC	CTION BSENC	OF TUB	E TO IS F2	BE AII	URE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		•	NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID:	ARCS 229	PER COMPARTMENT	CHANNEL CH	HECK-OUT
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
FLIGH'	T	DUNDANCY SCREENS		CIL ITEM
HDW/FU	NC A	В	C	
NASA [3 /1R IOA [3 /1R] [F]	[F] [] [NA] [P] P]	[X] * []
COMPARE [/] [N]] [и] [1	[N]
RECOMMENDATIONS:	(If diffe	erent from NASA)		•
[3 /1R] [F]	[F] [P] (AI	[A] DD/DELETE)
* CIL RETENTION	RATIONALE: (ADEQUATE JADEQUATE	
REMARKS: IOA AGREES WITH IOA RECOMMENDS TO MODE ON THIS FME OTHER QD FMEAS. IOA ALSO RECOMMET POSSIBLE FIRE/EXCREWS.	HAT "POPPET A. THIS IS THE SSM AGE NDS ADDING A	IONALE FOR FAILUFAILS OPEN" BE A CREDIBLE MODEREED WITH THE ICA STATEMENT TO	JRE OF A AN ADDED AS A E AND IS AI DA ISSUE. THE EFFECTS	ID B SCREENS. A FAILURE DORESSED ON E REGARDING

ASSESSME ASSESSME NASA FME	CNT	II):	RCS-2	30	L090-:	2			ASA DAT BASELIN NE]	•
SUBSYSTE MDAC ID: ITEM: COUPLING	3			ARCS 230 PROP	TK (JPPER	COMP	ARTI	MENT C	HANNEL	СНЕСК	:-ou	ľΤ
LEAD ANA	LYS	T:	:	C.D.	PRUS	ST							
ASSESSME	NT:	;											
	CRI		ICAL LIGH	ITY T	F	REDUNI	DANCY	SCI	REENS		CIL		
	F	IDV	/FU	NC	7	7	В		С				
NASA IOA	[3	/3 /3]	[]	[[]	[]	[]	*
COMPARE	[/]	[j	ָ []	, []	[]	
RECOMMEN	ľAdi	ΊΙ	ons:	(If	dif	fere	nt fro	om 1	NASA)	•			
	[3	/3]	[]	[]	[1	[ADD/D	ELE	TE)
* CIL RE	ETEN	T	ION :	RATION	ALE:	(If	appl	icak	•				
										DEQUATE DEQUATE	•]	
REMARKS: IOA FAII COUPLE" FLOW" BE CREDIBLE	LURI ANI E AI	י כ וסכ	'RES' ED A	TRICTE S A FA	D FI	LOW". RE MOI	IOA DE ON	REC THI	COMMENI S FME	DS THAT	"RES S IS	TRI A	
THE SSM								עפכ	ON OT	HER QU	r piemo	•	

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:		1	NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	ARCS 231 PROP TK LOWER	COMPARTM	ENT CHANNEL B	LEED COUPLING
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICA FLIG HDW/F	HT	DANCY SCRI	EENS C	CIL ITEM
NASA [2 /1 IOA [2 /1	R] [F]	[F] [NA]	[P] [P]	[X] * [X]
COMPARE [/] [N]	[N]	[]	[]
RECOMMENDATIONS	: (If differe	nt from NA	ASA)	
[/] []	[]	[] (A	[.DD/DELETE)
* CIL RETENTION	RATIONALE: (If	applicab	le) ADEQUATE INADEQUATE	
REMARKS: IOA AGREES WITH IOA RECOMMENDS POSSIBLE VIOLAT AND PROP TANK L	ADDING A STATEM IONS OF ORBITER	ENT TO THI ENTRY MAS	E EFFECTS REG SS PROPERTIES	ARDING

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	RCS-232	2150-2	2			ASA DA' BASELII N]
SUBSYSTEM: MDAC ID: ITEM:	ARCS 232 PROP TK	LOWER	СОМР	ARTMEN	IT CI	HANNEL	BLEED	COUPLING
LEAD ANALYST:	C.D. PRU	ST						
ASSESSMENT:								
CRITICA FLIG	LITY	REDUNI	DANCY	SCREE	ens		CIL ITE	
HDW/F		A	В		C		2 2 2 3	•
NASA [3 /3 IOA [3 /3] []	[]	[]	[] *]
COMPARE [/] []	[]	[]	[]
RECOMMENDATIONS	: (If di	ffere	nt fr	om NAS	SA)			
[3 /3] [,]	. []	[]	[(ADD/D] ELETE)
* CIL RETENTION	RATIONALE	: (If	appl	icable				
				-		DEQUAT: DEQUAT:]
REMARKS: IOA FAILURE MOD COUPLE" AND "RE FLOW" BE ADDED CREDIBLE FAILUR THE SSM AGREED	STRICTED F AS A FAILU E MODE AND	LOW". RE MOI IS AI	IOA DE ON ODRES	RECONTHIS	MENI FME	OS THA'	T "RES' IS IS	TRICTED A

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-233 03-2A-20	1090-1	NASA DATA: BASELINE NEW		
MDAC ID:	233			CHECK-OUT	COUPLING
LEAD ANALYST:	C.D. PRU	ST			
ASSESSMENT:					
CRITICAL FLIGH		REDUNDANC	Y SCREENS		CIL ITEM
HDW/FU		A	В .	C	11111
NASA [3 /1R IOA [3 /1R] [F] [P] [F] [NA] [P] P]	[X] *
COMPARE [/] [и] [и] []	[и]
RECOMMENDATIONS:	(If di	fferent f	rom NASA)		
[3 /1R] [F] [F] [P] (AD	[A] D/DELETE)
* CIL RETENTION : REMARKS: IOA AGREES WITH IOA RECOMMENDS TO MODE ON THIS FME OTHER QD FMEAS. IOA ALSO RECOMME	NASA/RI R HAT "POPP A. THIS THE SSM NDS ADDIN	ATIONALE ET FAILS IS A CRED AGREED WI	IN FOR FAILU OPEN" BE IBLE MODE TH THE IO MENT TO T	ADDED AS A AND IS AD A ISSUE. HE EFFECTS	D B SCREENS FAILURE DRESSED ON REGARDING
POSSIBLE FIRE/EX CREWS.	LTOSION U	MUNKU MNU	IIVRUKD I	O GROUND R	IIID IIVA

ASSESSMI ASSESSMI NASA FMI	ENT	I	D:	1/01, RCS-2 03-2	234	.090-:	2			NASA BASE	DATA: LINE NEW	[]	 = a
SUBSYSTEMDAC ID:				ARCS 234 PROP	TK I	OWER	СОМР	ARTM	ENT	CHECK	-out	cou	PLI	:NG
LEAD ANA	ALY	ST	:	C.D.	PRUS	T				v	*			
ASSESSME	ENT	:												
CRITICALITY FLIGHT						EDUNI	DANCY	SCR	EENS	;	CIL			
]			NC	A		В			С		TIE	M	
NASA IOA	[3 3	/3 /3]	[]	[]	[]		[]	*
COMPARE	[/]	[]	Ţ]	[]		[]	
RECOMMEN	VDA'	TI	ons:	(I	f dif	fere	nt fr	om N	ASA)					
	[3	/3]	[]	[]	[.]	(AI	[DD/D	ELE	TE)
* CIL RI	ETE	NT	ION	RATIO	NALE:	(If	appl:	icab:		ADEQU	ATE	[]	
REMARKS:	•								IN	ADEQU	ATE	Ĭ	j	
IOA FAIL	LUR													
COUPLE" FLOW" BI											'HAT ' THIS			CTED
CREDIBLE	E F.	AI	LURE	MODE	AND	IS A	DDRESS							
THE SSM	AG:	RE	ED W	ITH TI	HE IC	A ISS	SUE.							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-235 03-2A-20	01090-1	NASA DATA: BASELINE [] NEW [X]
SUBSYSTEM: MDAC ID:	ARCS 235	PLENUM SCREEN CHI	
LEAD ANALYST:	C.D. PRI	UST	
ASSESSMENT:			
CRITICAL FLIGH		REDUNDANCY SCREEN	IS CIL ITEM
HDW/FU		A B	C
NASA [3 /1R IOA [3 /1R] [F] [F] P] [NA]	[P] [X] * [P]
COMPARE [/] [и] [и]	[N]
RECOMMENDATIONS:	(If d	ifferent from NASA	A)
[3 /1R] [F] [F]	[P] [A] (ADD/DELETE)
· 	RATIONAL	E: (If applicable)	ADEQUATE [] INADEQUATE []
IOA RECOMMENDS T MODE ON THIS FME OTHER QD FMEAS. IOA ALSO RECOMME	HAT "POP A. THIS THE SSM NDS ADDI	PET FAILS OPEN" BI IS A CREDIBLE MOI AGREED WITH THE NG A STATEMENT TO	LURE OF A AND B SCREENS E ADDED AS A FAILURE DE AND IS ADDRESSED ON LOA ISSUE. THE EFFECTS REGARDING TO GROUND AND EVA

CREWS.

ASSESSME ASSESSME NASA FME	NT NT A	DZ II #:	ATE:	1/01, RCS-2 03-22	/88 236 A-20	1090-	2		N		DATA ELINE NEW	[,] ,]	
SUBSYSTE MDAC ID: ITEM:				ARCS 236		PLENU			СНЕСК	ניסס–	cou	PLIN	1G	
LEAD ANA	LYS	ST	:	C.D.	PRU	JST								
ASSESSME	NT:	:												
	CR		ICAL LIGH	ITY		REDUN	DANCY	SC	REENS			CII		
	F			NC		A	В		c	:			311	
NASA IOA	[3	/3 /3]]]	[[]	[]		[]	*
COMPARE	[/]	[]	ſ]	[]		[]	
RECOMMEN	'DA'	rIC	ons:	(Ii	f di	ffere	nt fr	om 1	NASA)					
		3	/3	3	[]	. []	[]	(A)	[DD/I	_	ETE)
* CIL RE	TEI	NT:	ION :	RATIO	NALE	E: (If	appl	ical	A	DEQU	JATE JATE	[[]	
REMARKS: IOA FAIL COUPLE" FLOW" BE CREDIBLE	ANI AI F	ODI AII	"RES ED A LURE	TRICTI S A FI MODE	ED F AILU ANI	FLOW". JRE MO D IS A	IOA DE ON DDRES	REC TH	OULD I COMMEN IS FME	NCLU IDS I	DE " HAT THIS	FAII "RES IS	TR.	

ASSESSMENT ID: NASA FMEA #:		1	BASELINE NEW	7 [X]
	ARCS 237 PROP TK ENTRY	SUMP BLE	ED COUPLING	
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAL		DANCY SCRI	EENS	CIL
FLIGH HDW/FU		В	С	TIEM
NASA [2 /1R IOA [2 /1R] [F]	[F] [NA]	[P] [P]	[X] *
COMPARE [/] [n]	[N]	[]	[]
RECOMMENDATIONS:	(If differe	nt from N	ASA)	
(/	1 [1	[]	[]	[] ADD/DELETE)
* CIL RETENTION	RATIONALE: (If	applicab		
	or of the section of		ADEQUATE INADEQUATE	
REMARKS: IOA AGREES WITH IOA RECOMMENDS A POSSIBLE VIOLATI AND PROP TANK LA	DDING A STATEM ONS OF ORBITER	ENT TO THI	E EFFECTS REC SS PROPERTIES	GARDING

ASSESSM ASSESSM NASA FM	ENT	TI	D:	RCS-2									
SUBSYST				ARCS 238 PROP	TK E	ENTRY	SUMP	BLI	EED CO	UPLING			
LEAD AN	ALY:	ST	:	C.D.	PRUS	ST							•-
ASSESSM	ENT	:											
	CR		ICAL LIGH	ITY	F	REDUNI	DANCY	SCI	REENS		CIL		
	J	_		NC	P	.	В		С		**11		
NASA IOA	ָ ֪֖֖֖֖֖֞֞֞֞֝֞֝֞֞֝	3	/3 /3]	[]	[]	[]	[] *	
COMPARE	[/]	[]	[]	[]	[]	
RECOMME	NDA!	rI	ons:	(If	dif	fere	nt fro	om 1	VASA)				
	[. 3	/3]	[]	[]	[] (A	[.DD/D] ELETE	Ξ)
* CIL R	ETE!	NT:	ION :	RATION	ALE:	(If	appl	icak			_	_	
										DEQUATE DEQUATE	[]	
COUPLE" FLOW" B	LURI ANI E AI E FI	D ' DDI AI:	"RES ED A LURE	TRICTE S A FA MODE	D FI ILUF AND	.OW". RE MOI IS AI	IOA DE ON ODRESS	REC THI	COMMENI IS FME	NCLUDE " OS THAT A. THIS HER QD F	"RES IS	TRICT A	red

ASSESSMENT DA ASSESSMENT ID NASA FMEA #:	: RCS-239			BASELINE NEW			
SUBSYSTEM: MDAC ID: ITEM:	ARCS 239 GIMBAL	BELLOWS					
LEAD ANALYST:	C.D. PR	RUST					
ASSESSMENT:							
FL	CALITY IGHT /FUNC	REDUNDAI A	NCY SCREE	ens C	CIL ITEM		
	/1] [/1] []	[] []	[]	[X] *		
•	/] [_	[]	[]	[]		
RECOMMENDATIO	NS: (If d	lifferent	from NAS	SA)			
<u>.</u>	/) []	[]	[]	[] ADD/DELETE)		
* CIL RETENTI	ON RATIONAI	LE: (If a	pplicable	adequate inadequate			
REMARKS: IOA RECOMMEND "ISOLATION VA CAUSES ON THI INCLUDE POSSI VAPORS.	LVE RELIEF S FMEA. IC	DEVICE F.	AILURE TO ECOMMENDS	RELIEVE" E	AND BE ADDED AS EFFECTS		

ASSESSME ASSESSME NASA FME	ENT :	ID:	RCS-2					N	IASA DATA BASELINE NEW	: []
SUBSYSTE MDAC ID: ITEM:			ARCS 240 GIMBA	L BE	LLOWS		٠.				
LEAD ANA	LYS	r:	C.D.	PRUS	T						
ASSESSME	:TN										
]	FLIGH					SCR			CIL ITE	
	HI	OW/FU	NC	А		В		C	;		
NASA IOA	[:	1 /1]	[]	[[]	[]	[X] *
COMPARE	[1	N N]	[]	Ţ]	[]	[N]
RECOMMEN	(DAT	cons:	(If	dif	fere	nt fro	om N	ASA)			
	[/]	[J	[]	[] (A	[[D/DD] ELETE)
* CIL RE	TEN	rion	RATION.	ALE:	(If	appl	icab)	le)			
					\				DEQUATE DEQUATE	[[]
NOW CONS BE QUEST MODE IN	DO 1 IDEI ION2 THE	RS TH ABLE. FMEA	E CRED IOA /CIL T	IBIL DOES O BE	YTI TON O NA	OF RES REGAI OPEN	STRIC RD TI [SSU]	CTED HE AB E,	RICTED F FLOW IN A SENCE OF	A BEI	LLOWS TO
BUT DUES	, KE	JOINTE.	ND INA	T IN	TO LY	2TTOK1	וטמיב	DE DE	MUUKESS	ED.	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-241 B	BASELINE [] NEW []					
SUBSYSTEM: MDAC ID: ITEM:	ARCS 241 PRESSURE RELIEF ASSEMBLY						
LEAD ANALYST:	C.D. PRUST						
ASSESSMENT:							
CRITICAL FLIGH HDW/FU		CIL ITEM					
NASA [/ IOA [2 /1R] [] [] [P] · [] *					
COMPARE [N /N] [N] [N] [N] [N]					
RECOMMENDATIONS:	(If different from NASA)						
[2 /1R] [P] [F] [P] [A] (ADD/DELETE)					
	RATIONALE: (If applicable) AD INAD	DEQUATE [] DEQUATE []					
REMARKS: NASA/RI DO NOT COVER THIS FAILURE MODE (BURST DISK INTERNAL LEAKAGE). IOA CONSIDERS THIS FAILURE MODE TO BE CREDIBLE AND RECOMMENDS IT BE ADDED TO 03-2A-201060-5. THE FAILURE HISTORY OF THE BURST DISK INCLUDES THIS FAILURE. THE SSM AGREED WITH THE IOA ISSUE.							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	700 0411		BASELINE NEW				
SUBSYSTEM: MDAC ID: ITEM:	ARCS 241 PRESSURE RELIE	F ASSEMBLY					
LEAD ANALYST:	C.D. PRUST						
ASSESSMENT:							
CRITICALI FLIGHT	TY REDUND	ANCY SCREENS	3	CIL ITEM			
HDW/FUN		В	С	IIIM			
NASA [2 /1R IOA [2 /1R] [P]] [P]	[F] [P] P]	[X] * [X]			
COMPARE [/] []	[] []	[]			
RECOMMENDATIONS:	(If differen	t from NASA)					
] []	[] [] (AI	[] DD/DELETE)			
* CIL RETENTION F	RATIONALE: (If		ADEQUATE	[]			
REMARKS: NO DIFFERENCES. REGARDING POSSIBI ORBITER ENTRY MAS AND EVA CREWS FRO	LE VIOLATIONS OF PROPERTIES CO	F PROP TANK ONSTRAINTS,	LANDING WI	EIGHT AND			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-242 03-2A-20106	50-3	NASA DATA: BASELINE NEW	
	ARCS 242 PRESSURE RE	ELIEF ASSEMBLY		
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAL: FLIGH HDW/FU	r	DUNDANCY SCREEN B	rs C	CIL ITEM
NASA [3 /1R IOA [1 /1] [F]] [AN] [P]	[X] * [X]
COMPARE [N /N] [N]	[и] [N]	[]
RECOMMENDATIONS:	(If diffe	erent from NASA	7)	
[/] []	ו נ ַ ז נ	[] (AI	[] DD/DELETE)
* CIL RETENTION	RATIONALE: (ADEQUATE NADEQUATE	•
REMARKS: IOA AGREES WITH I ORIGINALLY CONSI SYSTEM.	NASA/RI RATI DERED THE PR	ONALE FOR 3/1F	R FNP ASSIGN BY TO BE AN	NMENT. 102 EMERGENCY

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:			: [] [X]					
MDAC ID:	ARCS 242 PRESSURE RELIEF ASSEMBLY	a - 1 - 1 - 1 - 1						
LEAD ANALYST:								
ASSESSMENT:								
CRITICAL: FLIGHT HDW/FU	r	s c	CIL ITEM					
NASA [3 /1R IOA [1 /1] [P] [NA] [] [] [P]	[] *					
COMPARE [N /N] [N] [N] [n]	[N]					
RECOMMENDATIONS:	(If different from NASA)						
] [] [] [] (AI	[] DD/DELETE)					
* CIL RETENTION I	RATIONALE: (If applicable)	ADEQUATE NADEQUATE	[]					
REMARKS: IOA AGREES WITH NASA/RI RATIONALE FOR 3/1R PNP ASSIGNMENT. IOA ORIGINALLY CONSIDERED THE PRESS RELIEF ASSY TO BE AN EMERGENCY SYSTEM.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-243 03-2A-201091	1-1	NASA DATA: BASELINE NEW					
SUBSYSTEM:	ARCS 243	E TEST PORT COU	PLING					
LEAD ANALYST:	C.D. PRUST							
ASSESSMENT:								
CRITICAL FLIGH		UNDANCY SCREENS		CIL ITEM				
	NC A	В	С					
NASA [3 /1R IOA [3 /1R] [F]] [P]	[F] [[NA] [P] P]	[X] * []				
COMPARE [/] [N]	[N] []	[N]				
RECOMMENDATIONS:	(If differ	rent from NASA)		and the second s				
[3 /1R] [F]	[F] [P j (AD	[] DD/DELETE)				
* CIL RETENTION	RATIONALE: (If applicable) IN	ADEQUATE IADEQUATE	[]				
INADEQUATE [] REMARKS: IOA AGREES WITH NASA/RI FAILURE OF A AND B SCREENS. IOA RECOMMENDS THAT "POPPET FAILS OPEN" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON 03-2F-101070-1. THE SSM AGREED WITH THE IOA ISSUE. IOA ALSO RECOMMENDS ADDING A STATEMENT TO THE EFFECTS ABOUT POSSIBLE VIOLATIONS OF ENTRY MASS PROPERTIES CONSTRAINTS AND PROP TANK LANDING WEIGHT CONSTRAINTS. THE QUANTITY ON THIS FMEA IS INCORRECT.								

ASSESSMENT					NASA DATA:								
ASSESSMENT NASA FMEA	": "	D:	RCS-24 03-2A-	14 -2010	91-2]	BASELI N		[X		
SUBSYSTEM: MDAC ID: ITEM:			244										
LEAD ANALY	(ST	:	C.D. H	PRUST									
ASSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM													
			1C	A		В		С			TIEF	1	
NASA (IOA (3	/3 /3]	[]	[]	[]		[]	*
COMPARE [/]	[]	[]	[]	•	[]	
RECOMMENDA	ATI(ons:	(If	diff	erent	fro	om NAS	SA)					
	3	/3]	[]	[]	[]	(AI	[DD/DE	LE	TE)
* CIL RETE	ENT:	ION I	RATIONA	LE:	(If a	ppli	icable	•					
÷ .	.2			•				INAI	DEQUAT DEQUAT	E E	[]	
REMARKS: IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS TO COUPLE" AND "RESTRICTED FLOW". IOA RECOMMENDS THAT "RESTRICTED FLOW" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE FAILURE MODE AND IS ADDRESSED ON OTHER QD FMEAS. THE SSM AGREED WITH THE IOA ISSUE.													

ASSESSME ASSESSME NASA FME	NT I	D:	1/01/ RCS-2 03-2	45	.050-	·1		N	BASELINI NEV	E []	
SUBSYSTE MDAC ID: ITEM:	м:		ARCS 245 GROUN	ID MA	NUAI	ISOL	ATIO	N VAI	LVE			
LEAD ANA	LYSI	:	C.D.	PRUS	T							
ASSESSME	NT:											
		'ICAL 'LIGH		F	REDUN	IDANCY	SCR	EENS		CII		
		W/FU		A		В		C	2	***	11.1	
NASA IOA	[3 [3	/3]	[]	[]]]	[]	*
COMPARE	[/]	[]	[]	[]	[]	
RECOMMEN	DATI	ons:	(Ii	dif	fere	ent fr	om N	ASA)				
	[/]	[]	. []	[] ([ADD/[) ELE	TE
* CIL RE			RATION	IALE:	(If	appl	icab	F	ADEQUATE ADEQUATE]	41
NO DIFFE	RENC	ES.										

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: RCS-246 NASA FMEA #: 03-2A-201050-1									NASA BASE		[]	•	
SUBSYSTEM MDAC ID: ITEM:	1:		ARC 246	S				ON VA	LVE					-	
LEAD ANAI	LYSI	r:	C.D	. PRU	ST										
ASSESSMENT:															
C	CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM														
					A	E	3	•	C			LEI	1		
NASA IOA	[]	3 /3]]]]]	[]		[X]	*	
COMPARE	[]	1 /N]	[]	[]	[]		[N]		
RECOMMENI	ITAC	ons:	(If di	ffere	nt fr	om N	IASA)		-					
	[/]	. []	[]	[]	(A)	[DD/	/DI] ELF	ETE)	
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []															
REMARKS:							-	TIM	ADEQU	AIL	L		J		
	BASE	ED ON	"FA	ILURE	TO R	EMAIN	OPE	EN".	IOÀ	NOW	COI	1 S]	DF	RS S	ГНЕ
IOA 1/1 BASED ON "FAILURE TO REMAIN OPEN". IOA NOW CONSIDERS THE CREDIBILITY OF THIS FAILURE MODE TO BE QUESTIONABLE. IOA DOES															
NOT REGAI															
FMEA/CIL	TO	RF W	N OP	en is	SUE,	RO.L. L	つにひ	KECOI	MEND	THA.	T.	וחו	.5		

FAILURE MODE BE ADDRESSED.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-247 NONE			SA DATA: BASELINE NEW	[]
SUBSYSTEM: MDAC ID: ITEM:	ARCS 247 GROUND MANU	UAL ISOLA	TION VALV	Œ	
LEAD ANALYST:	C.D. PRUST				
ASSESSMENT:					
CRITICAL: FLIGHT	ITY REI	DUNDANCY	SCREENS		CIL ITEM
HDW/FUI	NC A	В	C		
NASA [/ IOA [1 /1] [] [] []	[x] *
COMPARE [N /N] []] [] []	[и]
RECOMMENDATIONS:	(If diffe	erent fro	m NASA)		
[1 /1	1 [] [] [] (AD	[A] D/DELETE)
* CIL RETENTION I	RATIONALE:	(If appli		EQUATE EQUATE	[]
REMARKS: NASA/RI DO NOT CO SSM AGREED THAT TO LINE EXTERNAL LEAR RETENTION RATIONAL IOA ALSO RECOMMENT THIS FAILURE BE TO EXPLOSION, EXPOSI	THIS VALVE I AKAGE FMEA ALE. NDS THAT THI INCLUDED IN	BODY SHOU (03-2 A- 20 E POSSIBL THE EFFE	DE (EXTER LD BE ADI 1013-1) W E PROP LE CTS (CORE	NAL LEAK DED TO TH VITH CORR CAKAGE EF COSION, F	AGE). THE E HELIUM ESPONDING FECTS OF

ASSESSMEN ASSESSMEN NASA FME	TV TV A #	DZ II	ATI D:	€:	1/ RC 03	1/01/88 NAS RCS-248 BA 03-2A-202112-1						NASA I BASEI	ATA LINE NEW	[]	
SUBSYSTEM MDAC ID:	•				24	8						3/4/5			-		
LEAD ANAI	LYS	T	:		c.	D.	PRUS	ST									
ASSESSMEN	NT:	:															
										CIL ITEM							
	F	IDV	N/I	U	NC		2	A	I	3		C				_	
NASA IOA	[1	/1 /1	L L]		[]	[]	[[]		[X X]	*
COMPARE	[/]		[]	[]	[1		[]	
RECOMMENI	ľAC	ľI	SNC	S:		(If	di	ffere	nt fi	om N	IASA)						
	[1	/1	L]		(]	C]	C]] ELI	ETE)
* CIL RET	ren	T	[0]	1]	RAT	ION	ALE	: (If	app]	icab		ADEQUA IADEQUA	TE TE	[]	
REMARKS: THIS FMEA COVERS ONLY THE BELLOWS LEAKAGE FAILURE MODE FOR THE PROP TANK ISOL VALVES. IOA HAS NO ISSUE WITH THIS FAILURE MODE, HOWEVER DOES RECOMMEND THAT THE EFFECTS INCLUDE THE POSSIBLE EXPOSURE OF EVA AND GROUND CREWS TO PROP OR PROP VAPORS. NASA/RI DO NOT COVER STRUCTURAL FAILURE, RUPTURE, OR EXTERNAL LEAKAGE OF THE VALVE HOUSING ON THIS FMEA OR ELSEWHERE. THE SSN AGREED THAT THIS VALVE BODY SHOULD BE ADDED TO THE PROP LINE EXTERNAL LEAKAGE FMEA (03-2A-202108-1) WITH CORRESPONDING RETENTION RATIONALE.																	

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	RCS-249			NASA I BASEI	DATA: LINE [NEW []
SUBSYSTEM: MDAC ID: ITEM:	ARCS 249 PROP TANK	: ISOL VL	7S 1/2	2 & 3/4/5		
LEAD ANALYST:	C.D. PRUS	T				- · ·
ASSESSMENT:						
FLIG	LITY R		SCRI	EENS C	CI	
NASA [/ IOA [1 /1] [] []	[]	[x] *
COMPARE [N /N] [] []	[]	[]	N]
RECOMMENDATIONS	: (If dif	ferent fr	om NA	ASA)		
[3 /1	R] [P] [1)	[P]	[/ (ADD/	A] DELETE)
* CIL RETENTION REMARKS:	RATIONALE:	(If app]	icab]		ATE []
IOA ITEM LIST S NOT COVER THIS ISSUE, BUT MAIN THRUSTER COULD	FAILURE MOD TAINS CONCE	E (RESTRI RN THAT F	CTED ESTRI	FLOW).	COA WIT	HDRAWS 1/1
THE SSM AGREED FMEA/CIL. IOA RESTRICTED FLOW FLOW THROUGH TH	THAT THIS F RECOMMENDS OF THE PRO	AILURE MO A 3/1R PE P TANK IS	DE SEP, 1,	/1 ABORT 1 /2 VALVES.	FMEA AN	D CIL FOR
ONE +X THRUSTER INABILITY TO CO VIOLATIONS OF E WEIGHT CONSTRAI	USED TO DU MPLETE A PL NTRY MASS P	MP ARCS I ANNED ARC	ROP I	OURING RTI MP COULD F	LS & TAI	IN

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-250	2110-3		BASELINE NEW				
MDAC ID:	ARCS 250 PROP TANK	K ISOL V	LV 1/2					
LEAD ANALYST:	C.D. PRUS	ST						
ASSESSMENT:								
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM								
HDW/FUI		A EI	B	C				
NASA [2 /2 IOA [3 /2R] []] [P] [P]	[] [P]	[X] *			
COMPARE [N /N] []	N] [N]	[N]	[]			
RECOMMENDATIONS:	(If di	fferent	from NAS	iA)				
[/] [] [1	[] (A)	[DD/DELETE)			
* CIL RETENTION	RATIONALE	: (If ap		e) ADEQUATE INADEQUATE				
REMARKS: IOA AGREES WITH	NASA/RI R	ATIONALE	FOR 2/2	2, 1/1 ABORT	ASSIGNMENT.			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-251 03-2A-20	2110-1		BASELINE	[]
MDAC ID:	251				
LEAD ANALYST:	C.D. PRU	JST			
ASSESSMENT:					
		REDUNDA	NCY SCREE	NS	CIL ITEM
		A	В	С	* * ***
NASA [3 /1R IOA [2 /1R] [P] P]	[P] [P]	[P] [P]	[] * [x]
COMPARE [N /] []	[]	[]	[N]
RECOMMENDATIONS:	(If di	fferent	from NAS	A)	e de grande de la companya de la companya de la companya de la companya de la companya de la companya de la co
				[P]	
* CIL RETENTION	RATIONALE	E: (If a		ADEOUATE	[]
REMARKS:					
VALVE BE UPGRADE	D TO A 3/	/1R PPP,	1/1 ABOR	T AND PLACE	D ON THE CIL
<pre>ITEM:</pre>					
ABORTS. INABILI IN VIOLATIONS OF	ENTRY MA	ASS PROP			

ASSESSME ASSESSME NASA FME	TN	ID	:	RCS-		110-3]		A DAT SELII NI			k]	
SUBSYSTE MDAC ID: ITEM:				ARCS 252 PROP	TANK	ISOL	VLV	3/4/	5/ 2	A &	В				
LEAD ANA	LYS	T:		C.D.	PRUS'	T									
ASSESSME	NT:														
			CAL IGH	ITY T	R	EDUND	ANCY	SCRE	ENS				CII ITI		
	Н	DW,	/FU	NC	A		В		4						
NASA IOA	[2 ,	/2 /2]	[]	[]	[]			[]	K] K]	*
COMPARE	[,	/]	[]	[]	[]			[]	
RECOMMEN	DAT	IOI	NS:	(I	f dif	feren	t fr	om NA	SA)						
	[/		[]	[]	[]	((AD	[D/I) DEI	ETE)
* CIL RE	TEN	TI	ON :	RATIO	NALE:	(If	appl	icabl			TAU(TAU([]	
REMARKS:		CE	s.								(UAII		L	J	

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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-253 03-2A-202110-1	NASA DATA: BASELINE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM:	ARCS 253 PROP TANK ISOL VLV 3/4/	/5/ A & B
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
FLIGH	ITY REDUNDANCY SCRE T NC A B	EENS CIL ITEM
NASA [3 /1R IOA [3 /1R] [P] [P]] [NA]	[P] [] * [P]
COMPARE [/] [] [N]	[] []
RECOMMENDATIONS:	(If different from NA	ASA)
1] [] []	[] [] (ADD/DELETE)
	RATIONALE: (If applicabl	le) ADEQUATE [] INADEQUATE []
PPP, 1/1 ABORT FO	OR THE 3/4/5 VALVE, HOWE OR THE 1/2 VALVE WHICH I SMENT SHEET RCS-251.	EVER IOA RECOMMENDS A 3/1 IS ALSO COVERED ON THIS

NASA DATA:

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-254		DATA: LINE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM:	ARCS 254 MANIFOLD 1/2 GROU		LING
LEAD ANALYST:	C.D. PRUST		•
ASSESSMENT:			• • •
	ITY REDUNDANC	CY SCREENS	CIL ITEM
FLIGH HDW/FU		в с	
NASA [2 /1R IOA [2 /1R	[F] [F] [F] [P] NA] [P]	[X] * [X]
COMPARE [/] [N] [N] []	[]
RECOMMENDATIONS:	(If different	from NASA)	
[2 /1R	[F] [F] [P]	[A] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If app	ADEQ	JATE [] JATE []
IOA RECOMMENDS T MODE ON THIS FME OTHER QD FMEAS. IOA ALSO RECOMME FIRE/EXPLOSION H	NASA/RI RATIONALE HAT "POPPET FAILS A. THIS IS A CREI THE SSM AGREED WINDS ADDING STATEM AZARD AND HAZARD THIS FMEA APPEARS	OPEN" BE ADDED DIBLE MODE AND TH THE IOA ISS ENTS TO THE EF TO GROUND AND	O AS A FAILURE IS ADDRESSED ON SUE. FECTS REGARDING EVA CREWS.

ASS ASS NAS	ESSME ESSME A FME	NT NT A	D. I! #:	ATE: D:	1/ RC 03	01/8 S-25 -2A-	8 5 201	080-	·3					LINE	[]	
SUB	SYSTE	: M:			AR 25	.CS 5) P	URG	E C	OUPL	ING			
LEA	D ANA	LY	ST	:	c.	D. P	RUS	T									
ASS	ESSME	NT	:														
	D ANALYST: C.D. PRUST ESSMENT: CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C NASA [3 /3] [] [] [] * IOA [3 /3] [] [] [] []																
		1	_				A		В			С			TIL	M	
]	3 3	/3 /3]		[]	[]		[[]		[]	*
COM	PARE	[/]	-[] [] [[]		
REC	OMMEN	IDA'	ΤI	ons:		(If	dif	fere	ent fro	mc	NAS	A)					
		[3	/3]		[1	[]		[]	(A			
* C	IL RE	TE!	NT	ION	RAT	'IONA	LE:	(If	appl:	ica		A			_]	
IOA COU FLO CRE	FAII PLE" W" BE DIBLE SSM	UR AN A A A G	D DD OD RE	"RES ED A E AN ED W	TRI S A D I ITH	CTED FAI S AD THE	FLUR DRE	OW". E MC SSEI A IS	IOA DE ON ON O	RE TH THE	COM IS R Q	MENI FME D FI	OS I A. MEAS	HAT THIS	"RES	TR	
	×									_							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-256 03-2A-201080-1	N.P E	ASA DATA: BASELINE [] NEW [X]
SUBSYSTEM:	ARCS 256	· Free Tak	
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
		ANCY SCREENS	
MDAC ID: 256 ITEM: MANIFOLD 3/4/5 GROUND PURGE COUPLING LEAD ANALYST: C.D. PRUST ASSESSMENT: CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C NASA [2 /1R] [F] [F] [P] [X] * IOA [2 /1R] [P] [NA] [P] [X]			
NASA [2 /1R IOA [2 /1R] [F]] [P]	[F] [P [NA]] [X] * [X],
COMPARE [/] [N]	[N] [] []
RECOMMENDATIONS:	(If differen	t from NASA)	·
[2 /1R] [F]	[F] [P] [A] (ADD/DELETE)
	RATIONALE: (If		
IOA AGREES WITH IOA RECOMMENDS TO MODE ON THIS FME	HAT "POPPET FAI A. THIS IS A C	LS OPEN" BE AL REDIBLE MODE A	DED AS A FAILURE
IOA ALSO RECOMME FIRE/EXPLOSION H THE QUANTITY ON	AZARD AND HAZAR	D TO GROUND AN	

ASSESSMI ASSESSMI NASA FMI	TNE	I	D:	RC	01/8 S-25 -2A-	57	80-3				ASA DA BASELI N	NE]	
SUBSYSTI MDAC ID: ITEM:				AR 25 MA	7	OLD 3	3/4/5	GROU	סאנ פאנ	JRGE	COUPL	ING	}		
LEAD ANA	ALYS	ST	:	c.	D. I	RUSI							'-		-
ASSESSMI	CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C NASA [3 /3] [] [] [] * 10A [3 /3] [] [] [] []														
	CR				ą.	RI	EDUND	ANCY	SCREI	ens	e e veyk e			4	
	1					A		В		С				-	
NASA IOA]	3	/3 /3]		[]	[]	[]	-	[]	*
COMPARE	[/]		[]	[]	[]		[]	
RECOMME	NDA'	TI(ons:		(If	dif	feren	t fro	om NAS	5A)	. i.º				
	[3	/3]		[]	[]	[]	(AI	[ID/DC		TE)
* CIL R	ETE	NT	ION	RAI	'ION	ALE:	(If	appl:	icable	A	DEQUAT DEQUAT]	
REMARKS IOA FAI: COUPLE" FLOW" B! CREDIBL! THE SSM THE QUAR	LUR AN E A E M AG	D DD OD RE	"RES ED A E AN ED W	TRI S A ID I	CTE A FA S A I TH	D FLO ILURI DDRES E IO	OW". E MOD SSED A ISS	IOA E ON ON O' UE.	RECOI THIS THER (LD I MMEN FME QD F	NCLUDE DS THA A. TH MEAS.	T' IIS	- FAILS	rri	'O CTEI

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-258		NASA DAS BASELII NI									
SUBSYSTEM: MDAC ID: ITEM:	ARCS 258 RCS CROSSFE	ED VLV 1/2 (OR 3/4/5									
LEAD ANALYST:	C.D. PRUST	**										
ASSESSMENT:												
CRITICAL FLIGH		UNDANCY SCRI	EENS	CIL ITEM								
HDW/FU	NC A	В	С									
NASA [/ IOA [1 /1] []											
COMPARE [N /N] []	[]	[]	[N]								
RECOMMENDATIONS:	(If diffe	rent from NA	ASA)	and the contract of								
[2 /2	1. []	[]	[,]	[A] (ADD/DELETE)								
* CIL RETENTION :	RATIONALE: (If applicabl	.e) ADEQUATI INADEQUATI	E []								
NASA/RI DO NOT C SSM AGREED THAT ON 03-2A-202111- ABORT FOR RESTRI IOA WITHDRAWS 1/	RESTRICTED F 2 (2/2, 1/1 CTED FLOW.	LOW SHOULD E ABORT). IOA	BE ADDED AS AGREES WIT	A FAILURE MODE TH A 2/2, 1/1								
RESTRICTED FLOW THROUGH.												

ASSESSMENT DA ASSESSMENT II NASA FMEA #: SUBSYSTEM:	ATE: 1/01 D: RCS- 03-2	/88 259 A-2021	12-1			SA DATA ASELINE NEW	[
SUBSYSTEM: MDAC ID: ITEM:	259	CROSSFI			OR 3/4	/5			
LEAD ANALYST:	c.D.	PRUST							
ASSESSMENT:									
FI	CALITY LIGHT V/FUNC		OUNDANG	CY SCR	EENS C		CI	L EM	
				_	•	1	•	., .	
IOA [1	/1] /1]	[]	[]	[]	[х ј х ј	*
COMPARE [/]	[]	. []	[]	[)	
RECOMMENDATIO	ons: (I	f diffe	erent i	from N	ASA)				
, [,1	/1]	[]	ſ]	[] . (AI	[DD/	A] DEL	ETE)
* CIL RETENTI REMARKS:	ON RATIO	NALE: (If app	olicab:	AD	EQUATE EQUATE]	
THIS FMEA COV CROSSFEED VAI HOWEVER DOES EXPOSURE OF E NASA/RI DO NO LEAKAGE OF TH	VES. IOM RECOMMENI VA AND GI T COVER S	A HAS N D THAT ROUND C STRUCTU	O ISSU THE EF REWS T RAL FA	JE WITH FECTS O PROP VILURE	H THIS INCLU P OR P RUPT	FAILURI DE THE I ROP VAPO URE, OR	E M POS DRS EX	ODE SIB TER	, LE
AGREED THAT TEXTERNAL LEAK RETENTION RAT	HIS VALVI AGE FMEA	E BODY	SHOULD	BE A	DDED TO	O THE PR	ROP	LI	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-260	11-1	NASA DATA: BASELINE NEW	
	ARCS 260 RCS CROSSF	EED VLV 1/2		
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAL: FLIGH		DUNDANCY SCREEN	s	CIL ITEM
	IC A	В	С	
NASA [3 /1R IOA [2 /2] [P] [P] [P]	[x] *
COMPARE [N /N] [N] [и] [N]	[N]
RECOMMENDATIONS:	(If diff	erent from NASA)	
[/] [1, [1, [] (AI	[] D/DELETE)
* CIL RETENTION	RATIONALE:	(If applicable)	ADEQUATE NADEQUATE	[]
REMARKS: IOA AGREES WITH	NASA/RI RAT	CIONALE FOR 3/1R	PPP CRIT A	ASSIGNMENT.

ASSESSME ASSESSME NASA FME	ENT I	D:	RCS-	L/88 -261 2 A- 202	2111-	-2			SA DATA ASELINE NEW]	
SUBSYSTE MDAC ID:			ARCS 261 RCS		FEEI	O VLV	1/2					
LEAD ANA	LYST	:	C.D	. PRUS	т							
ASSESSME	ENT:									÷		
	F	LIGH				NDANCY	SCR			CII		
	HD	W/FU	NC	P	L	В		С				
NASA IOA	[2 [2	/2	.]	[I)]	[P []	[P []	K]	() * ()	
COMPARE	[/)	[]	1]	[N]	[1	3	[] .	
RECOMMEN	IDATI	ONS:	(:	f dif	fere	ent fr	om N	ASA)				
	[/)	[]	[]	[] (A	[DD/[] DELETE)
* CIL RE		'ION	RATIO	ONALE:	(II	f appl	icab	AD	EQUATE EQUATE	[]	
NO DIFFE	ERENC	ES.										

ASSESSME ASSESSME NASA FME	NT NT A	D2 II #:	ATE: O:	1/01/ RCS-2 03-2A	88 62 -2	021	111-	1			·· -		NZ I	ASA D BASEL	ATA INE NEW	[]	• · · · · · · · · · · · · · · · · · · ·
SUBSYSTEM MDAC ID:				ARCS 262 RCS C	RO	551	FEED	V:	LV	7 3	3/4/5	17.5	eer je					'हु [*] गा	- prop
LEAD ANA	LYS	ST:	:	C.D.	PR	UST	r												
ASSESSME	NT	:																	
ı	CR:		ICAL: LIGH:	ITY F		RI	EDUN	DA	10	Y.	SCRE	ENS				C:	IL PEN		
	I	HDV	/FUI	NC		A				В			С						
NASA IOA	[3 2	/1R /2] [P] [P] [P]								[[x]	*				
COMPARE	[N	/N]	[N]		[N]	[N]	•	[N]	
RECOMMEN	DA!	ric	ons:	(If	d	if	fere	nt	f	fro	om NA	SA;)						
	3		/]	[1		[]	[]	(A)		/DI		TE)
* CIL RE	TE	NT.	ION 1	RATION	AL	E:	(If	a	pr	1:	icabl		A)	DEQUA DEQUA	TE TE	[]	
REMARKS: IOA ACCE HOWEVER, INTERNAL LEAKAGE	I LA	OA EA RG	MAI KAGE E EN	NTAINS DURIN OUGH T	G G Q	ON FL CA	CERN IGHT USE	R AN	EC] Y	A) (O) (P)	RDING A ACC ROBLE	PP Di EP'	CI ETI IS W	RIT A ECTAB SSM OULD	SSIC ILI' POS BE	GNI TY IT:	MEI OI	NT. F	HAT

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:			1/01/88 RCS-263 03-2A-202111-2					NASA DATA: BASELINE [NEW [X]				
SUBSYSTEM: MDAC ID: ITEM:			ARCS 263 RCS		SSI	FEED	VL)	V 3	3/4/	5								
LEAD ANALYST:				C.D.	PRI	JS:	r											
	ASSESSMENT:																	
CRITICAL FLIGH HDW/FU			T		RI A		DAN	CY B	SCRI	EEN	s C				IL PEM			
	NASA IOA	[2	2 /2 2 /2]	[P]	[P]	[P]]	X X]	*
	COMPARE	[/]	[N]	[N]	[N]		[]	•
	RECOMMENDATIONS: (If different from NASA)																	
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	* CIL RE	TENT	rion	RATIO	NALI	Ξ:	(If	apı	91 5	icab:			DEQUATI DEQUATI		[]	
	CULTULA																	

NO DIFFERENCES.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-264		NASA DATA: BASELINE NEW						
	ARCS 264 CROSSFEED LINES								
LEAD ANALYST:	C.D. PRUST			•					
ASSESSMENT:									
CRITICAL FLIGH	ITY REDUNDAN	CY SCREENS	3	CIL					
HDW/FU		В	С	TIEF					
NASA [/ IOA [1 /1] [] [] []	[] * [X]					
COMPARE [N /N] [] [] [j .	[N]					
RECOMMENDATIONS:	(If different	from NASA)							
. [/	1 [1 [] [] (AI	[] DD/DELETE)					
	RATIONALE: (If app		ADEQUATE NADEQUATE	[]					
REMARKS: NASA/RI DO NOT COVER RESTRICTED FLOW IN A SEGMENT OF LINE DUE TO OBSTRUCTION OR DEFORMATION (CRIMPING). SUCH AN OCCURRENCE COULD RESULT IN 2/2, 1/1 ABORT EFFECTS, HOWEVER THE CREDIBILITY OF SUCH AN OCCURRENCE IS QUESTIONABLE. ANY CONTAMINATION WOULD FLOW TO DOWNSTREAM FILTER OR COMPONENT. IOA RECOMMENDS THAT SUCH A FAILURE BE ADDRESSED ON THE FMEA/CIL, BUT DOES NOT REGARD THIS RECOMMENDATION AS AN OPEN ISSUE.									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-265 03-2A-20210	8-1	NASA DATA: BASELINE [] NEW [X]								
SUBSYSTEM: MDAC ID: ITEM:	ARCS 265 CROSSFEED L										
LEAD ANALYST:	C.D. PRUST										
ASSESSMENT:											
CRITICAL: FLIGHT	ITY RED	UNDANCY S	CREENS	CIL ITEM							
HDW/FUI		В	С	1111							
NASA [1 /1 IOA [1 /1] []	[]	[]	[X] * [X]							
COMPARE [/	ן נ ז	[]	[]	[]							
RECOMMENDATIONS:	(If diffe	rent from	NASA)								
[/] []	[]	[]	[] (ADD/DELETE)							
* CIL RETENTION I	RATIONALE: (If applic	•	73.MT							
DEMA DVC -				UATE [] UATE []							
IOA RECOMMENDS THAS A CAUSE ON THE FAILURE WHICH SHOULD INCLUDE VACORRESPONDING RES	INADEQUATE [] REMARKS: IOA RECOMMENDS THAT "FAILURE OF LINE BELLOWS TO DEFLECT" BE ADDED AS A CAUSE ON THIS FMEA/CIL. IOA CONSIDERS THIS TO BE A CREDIBLE FAILURE WHICH SHOULD BE ADDRESSED ON THE FMEA/CIL. THIS FMEA SHOULD INCLUDE VALVE BODIES IN THE ITEM LIST AND CORRESPONDING RETENTION RATIONALE. IOA ALSO RECOMMENDS THAT THE										
PROP OR PROP VAPO		EAPOSURE	OF EVA AN	O GROUND CREWS TO							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:			PCS-2	66	120-	-1	NASA DATA: BASELINE [NEW [}						
SUBSYSTE MDAC ID: ITEM:			ARCS 266 MANIF	OLD	1, 1	ISOL V	ĽV						
LEAD ANA	LYST	':	C.D.	PRUS'	Г								
ASSESSME	NT:												
	F	'ICAL 'LIGH' W/FU	r	R: A		idancy B	SCI		C		CI:		
NASA IOA	[3 [3	/1R /3]	[P]	[N]	A]	[]	P]		[]	*
COMPARE	C	/N	j	[N]	[и]	[]	n j		[]	
RECOMMEN	IDATI	ons:	(If	dif	fere	ent fro	om 1	NASA)					
	[/]	[3	[]	[3	(AI	[DD/1	DELE	TE
* CIL RE		ON :	RATION	ALE:	(If	appl:	icab		ADEQU ADEQU	ATE ATE	[]	
REMARKS:		ITH 1	NASA/R	I RA	rion	NALE FO	OR 3	3/1R I	PNP A	SSIGN	IME	NT.	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		NASA DATA: BASELINE [] NEW [X]									
SUBSYSTEM: MDAC ID: ITEM:	ARCS 267 MANIFOLD 1, ISOL VLV										
LEAD ANALYST:	C.D. PRUST										
ASSESSMENT:											
CRITICAI FLIGH HDW/FU	CIL ITEM C										
NASA [3 /1R IOA [3 /1R	[P] [P] [E] [P] [] * P] [X]									
COMPARE [/] [N]									
RECOMMENDATIONS:	(If different from NASA)	e v ille de la companya de la compa									
[3 /1F	[P] [P] [P] [A] (ADD/DELETE)									
무합물 [RATIONALE: (If applicable)	ADEQUATE [] NADEQUATE []									
IOA RECOMMENDS T 3/1R PPP, 1/1 AE ON ONE MANIFOLD OMS OR ARCS DUMI RESULTING IN POS	INADEQUATE [] REMARKS: IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 3/1R PPP, 1/1 ABORT AND PLACED ON THE CIL. LOSS OF ALL THRUSTERS ON ONE MANIFOLD MAY RESULT IN THE INABILITY TO COMPLETE ADEQUATE OMS OR ARCS DUMPS DURING RTLS OR TAL, RESULTING IN POSSIBLE VIOLATIONS OF ENTRY MASS PROPERTIES CONSTRAINTS OR PROP TANK LANDING WEIGHT CONSTRAINTS.										

1/01/88 RCS-268 03-2A-201080-1	NASA DATA: BASELINE NEW					
ARCS	e de la compansión de l					
C.D. PRUST						
	•					
TY REDUNDANCY SO	CREENS	CIL ITEM				
C A B	С					
[F] [F]] [P] [NA]	[P] [P]	[X] * [X]				
] [N] [N]	[]	[]				
(If different from	NASA)					
] [F] [F]	[P] (AD	[A] D/DELETE)				
ATIONALE: (If applica	able) ADEQUATE INADEQUATE	[]				
AT "POPPET FAILS OPEN THIS IS A CREDIBLE THE SSM AGREED WITH TO DS ADDING STATEMENTS ZARD AND HAZARD TO GE	N" BE ADDED AS A E MODE AND IS AD THE IOA ISSUE. TO THE EFFECTS ROUND AND EVA CR	FAILURE DRESSED ON REGARDING				
	ACS-268 03-2A-201080-1 ARCS 268 MANIFOLD 1, GROUND PO C.D. PRUST Y REDUNDANCY SO C A B [F] [F] [NA] [N] [N] (If different from [F] [F] ATIONALE: (If applications) ASA/RI RATIONALE FOR AT "POPPET FAILS OPEN C THIS IS A CREDIBLY ON ADDING STATEMENTS CARD AND HAZARD TO GI	RCS-268 BASELINE D3-2A-201080-1 ARCS 268 MANIFOLD 1, GROUND PURGE/DRAIN COUPT C.D. PRUST TY REDUNDANCY SCREENS A B C [F] [F] [P] [NA] [P] [N] [N] [N] [If different from NASA) [F] [F] [P] ATIONALE: (If applicable)				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/01/88 RCS-269 03-2A-201	080-3		NASA DATA: BASELINE [NEW [X							
SUBSYSTEM: MDAC ID: ITEM:	ARCS 269 MANIFOLD			RAIN COU	PLING	;					
LEAD ANALYST:	C.D. PRUS	T									
ASSESSMENT:											
CRITICAI FLIGH		EDUNDANCY	SCREENS	र स	CIL ITEM						
	INC A	. В		С							
NASA [3 /3 IOA [3 /3] [] [] []	[] *					
COMPARE [/] [] [] []	[].					
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)								
[3 /3] [] [] [] . (2	[ADD/D] ELETE)					
* CIL RETENTION	RATIONALE:	(If appl	•								
			IN	ADEQUATE ADEQUATE	[]					
REMARKS: IOA FAILURE MODE COUPLE" AND "RES FLOW" BE ADDED A CREDIBLE MODE AN THE SSM AGREED W THE QUANTITY ON	STRICTED FLAS A FAILUR OF IS ADDRESTITH THE IO	OW". IOA E MODE ON SSED ON O A ISSUE.	RECOMME THIS FM THER QD	NDS THAT EA. THIS FMEAS.	"RES	TRICTED					

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	PCS-270			NASA DATA: BASELINE [] NEW [X]								
MDAC ID:	ARCS 270 MANIFOL	D 2, IS	or ara									
LEAD ANALYST:	C.D. PR	C.D. PRUST										
ASSESSMENT:												
FLIG	HT	REDUND.	ANCY SCRE	ENS C	CIL ITEM							
nuw/r	JNC	A	Ь	C								
NASA [3 /11 IOA [3 /3] [P]	[NA] []	[P] []	[] *							
COMPARE [/N] [и ј	[N]	[N]	[]							
RECOMMENDATIONS	: (If d	ifferen	t from NA	SA)								
[/] []	[].	[] (A	[ADD/DELETE							
* CIL RETENTION		E: (If	applicabl	e) ADEQUATE INADEQUATE	[]							
	REMARKS: OA AGREES WITH NASA/RI RATIONALE FOR 3/1R PNP ASSIGNMENT.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		NASA DATA: BASELINE NEW	[]
SUBSYSTEM: MDAC ID: ITEM:	ARCS 271 MANIFOLD 2, ISOL	VLV	. 2 44
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT: .			
CRITICAL FLIGH	ITY REDUNDANC T	Y SCREENS	CIL ITEM
HDW/FU	NC A	В С	
NASA [3 /1R IOA [3 /1R] [P] []	P] [P] P] [P]	[] * [x]
COMPARE [/] [] [] []	[N]
RECOMMENDATIONS:	(If different f	rom NASA)	
[3 /1R] [P] [[A] D/DELETE)
	RATIONALE: (If app	ADEQUATE	
3/1R PPP, 1/1 ABO ON ONE MANIFOLD I OMS OR ARCS DUMPS RESULTING IN POS	ORT AND PLACED ON ' MAY RESULT IN THE ' S DURING RTLS OR T	F ENTRY MASS PROPER	LL THRUSTERS TE ADEQUATE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:				NASA DATA: BASELINE [] NEW [X]							
SUBSYSTEM: MDAC ID: ITEM:	272	ARCS 272 MANIFOLD 2, GROUND PURGE/DRAIN COUPLING									
LEAD ANALYST:	C.D. PRU	JST									
ASSESSMENT:											
CRITICAL FLIGH		REDUNDANG	CY SCREENS	;	CIL ITEM						
	NC	A	В	C							
NASA [2 /1R IOA [2 /1R] [F] [P] [F] [NA] [P] P]	[X] *						
COMPARE [/] [и] [N] []	[]						
RECOMMENDATIONS:	(If d	ifferent :	from NASA)	l							
[2 /1R	.] [F] [F] [P] (AI	[A] DD/DELETE)						
* CIL RETENTION	RATIONAL	E: (If ap)		ADEQUATE NADEQUATE							
INADEQUATE [] REMARKS: IOA AGREES WITH NASA/RI RATIONALE FOR FAILURE OF A AND B SCREENS IOA RECOMMENDS THAT "POPPET FAILS OPEN" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE MODE AND IS ADDRESSED ON OTHER QD FMEAS. THE SSM AGREED WITH THE IOA ISSUE.											
IOA ALSO RECOMME FIRE/EXPLOSION H	AZARD AN	D HAZARD'	TO GROUND	AND EVA C	REWS.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	500 000	080-3	NASA DATA: BASELINE [] NEW [X]									
SUBSYSTEM: MDAC ID: ITEM:	ARCS 273 MANIFOLD	2, GROUND	PURGE/D	RAIN COUP	LING							
LEAD ANALYST:	C.D. PRUS	T										
ASSESSMENT:	ASSESSMENT:											
CRITICAL: FLIGHT	ITY R	EDUNDANCY	SCREENS		CIL ITEM							
HDW/FUI		В	,	С	ITE							
NASA [3 /3 IOA [3 /3] [] [] []]] *]						
COMPARE [/] [) [] []	[]						
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)									
[3 /3	1 .	, 1 (] [] (A	[DD/D1] ELETE)						
* CIL RETENTION I	RATIONALE:	(If appl		*		_						
			IN.	ADEQUATE ADEQUATE	[]						
INADEQUATE [] REMARKS: IOA FAILURE MODES ON ANALYSIS SHEET SHOULD INCLUDE "FAILS TO COUPLE" AND "RESTRICTED FLOW". IOA RECOMMENDS THAT "RESTRICTED FLOW" BE ADDED AS A FAILURE MODE ON THIS FMEA. THIS IS A CREDIBLE MODE AND IS ADDRESSED ON OTHER QD FMEAS. THE SSM AGREED WITH THE IOA ISSUE. THE QUANTITY ON THIS FMEA APPEARS TO BE INCORRECT.												

ASSESSME ASSESSME NASA FME		RCS-274	1/01/88 RCS-274 03-2A-202120-1					NASA DATA: BASELINE [] NEW [X]				x]	
SUBSYSTEM: ARCS MDAC ID: 274 ITEM: MANIFOLD				, IS	OL	VI	v						
LEAD ANA	เบรา	?											
ASSESSMENT:													
								CII					
	HDW/FU		A			В			С				
NASA IOA	[3 /1R [3 /3] [P]	[NA]]	P]	[] *	
COMPARE	[/N] [N]	[N]	[N]	[]	
RECOMMEN	DATIONS:	(If d	liff	eren	t 1	fro	m N	ASA))	•			
	[/] []	נ]	[[ADD/1] DELETE)	
* CIL RE	TENTION	RATIONAI	E:	(If	app	pli	.cab			DEQUATE DEQUATE	-]	
REMARKS:	INADEQUATE [] REMARKS: IOA AGREES WITH NASA/RI RATIONALE FOR 3/1R PNP ASSIGNMENT.												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-275 03-2A-202120-3	NASA DATA: BASELINE [] NEW [X]
	ARCS 275 MANIFOLD 3, ISOL VLV	
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
FLIGH	REDUNDANCY SCREENS T NC A B	S CIL ITEM C
NASA [3 /1R IOA [3 /1R	[P] [P] [[P] [P] [P] [] * P]
COMPARE [/] [] [] [] [N]
RECOMMENDATIONS:	(If different from NASA)
[3 /1R	[P] [P] [P] [A] (ADD/DELETE)
	RATIONALE: (If applicable)	ADEQUATE [] NADEQUATE []
3/1R PPP, 1/1 AB ON ONE MANIFOLD OMS OR ARCS DUMP RESULTING IN POS	CHAT THIS ITEM AND FAILURE DORT AND PLACED ON THE CIL. MAY RESULT IN THE INABILITY OF STALL, SIBLE VIOLATIONS OF ENTRY DORONDO TANK LANDING WEIGHT CO.	LOSS OF ALL THRUSTERS Y TO COMPLETE ADEQUATE MASS PROPERTIES

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-276 03-2A-201080-1	NASA DATA: BASELINE NEW	
SUBSYSTEM:	ARCS 276 MANIFOLD 3, GROUND P	URGE/DRAIN COUPI	LING
LEAD ANALYST:	C.D. PRUST	e e e	
ASSESSMENT:			
CRITICAL		CREENS	CIL ITEM
FLIGHT HDW/FUN		c	TTEM
NASA [2 /1R IOA [2 /1R] [F] [F]] [P] [NA]	[P] [P]	[X] * [X].
COMPARE [/] [N] [N]	[]	[]
RECOMMENDATIONS:	(If different from	NASA)	
[2 /1R] [F] [F]	[P] (AI	[A] DD/DELETE)
* CIL RETENTION H	RATIONALE: (If applic	able) ADEQUATE INADEQUATE	[]
IOA RECOMMENDS THE MODE ON THIS FMEAD OTHER QD FMEAS.	NASA/RI RATIONALE FOR HAT "POPPET FAILS OPE A. THIS IS A CREDIBL THE SSM AGREED WITH	FAILURE OF A AN N" BE ADDED AS A E MODE AND IS AD THE IOA ISSUE.	ID B SCREENS A FAILURE ODRESSED ON

FIRE/EXPLOSION HAZARD AND HAZARD TO GROUND AND EVA CREWS.

THE QUANTITY ON THIS FMEA APPEARS TO BE INCORRECT.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	Dec 033	080-3		BASELIN	
	ARCS 277 MANIFOLD	3, GROUNI	PURGE,	DRAIN COU	JPLING
LEAD ANALYST:	C.D. PRUST	r		÷	
ASSESSMENT:					
CRITICAL FLIGHT HDW/FUI	r	EDUNDANC) I		1S C	CIL
nDW/FOI	NC A		,	C	
NASA [3 /3 IOA [3 /3] [] []	[]	[] *
COMPARE [/] [] []	[]	[]
RECOMMENDATIONS:	(If dif	ferent fi	om NAS	A)	
[3 /3] [] []	[]	[] (ADD/DELETE)
* CIL RETENTION	RATIONALE:	(If app) ADEQUATI INADEQUATI	
REMARKS: IOA FAILURE MODE: COUPLE" AND "RES' FLOW" BE ADDED AND CREDIBLE MODE AND THE SSM AGREED WOTHE QUANTITY ON	TRICTED FLO S A FAILURY D IS ADDRES ITH THE ION	OW". IOA E MODE ON SSED ON O A ISSUE.	T SHOUL A RECOMI N THIS I	D INCLUDE MENDS THAT FMEA. THI D FMEAS.	"FAILS TO I "RESTRICTEI

ASSESSMEN	T D	ATE:	1/01/	88					NASA DA	TA:	
ASSESSMEN	T I	D:	RCS-2	78		_			BASELI		
NASA FME	\ #:		03-2A	-202	120-	Ļ			V	IEW [X]
SUBSYSTEM	1 :		ARCS								
MDAC ID:			278	OID.	4 T	201 17	T 17				
ITEM:			MANIF	OPD .	±, ±	SOT A	ΠΛ				
LEAD ANAI	LYST	:	C.D.	PRUS!	r						
ASSESSMEN	YT:										
C			ITY	RI	EDUN	DANCY	SCR	EENS	5	CI	
		LIGH! W/FUI	NC .	A		В			С	IT:	EM
	****	.,									
NASA IOA	[3	/1R	j	[P]	[N.	A]	[P]	[] *]
IOA	LS	/3	1	L	j	L	1	ι	J	L	j
COMPARE	[/N	J	[N]	[1]	[n]	[]
DECOMEN	. 3 m T /	OMC.	/ T	` a ; e:	fore	. + <i>-</i>	om M	7 C 7 Y			
RECOMMENI	JATT	ONS:	(11	uii.	rere	ill II	OIII IA	ASA ,	•		
	[/]	[]	[]	٦,]	[(ADD/] DELETE)
							·	7 - 1			
* CIL RET	LENT.	ION	RATION	ALE:	(TI	appı	ıcab	Te)	ADEQUAT	E ſ	1
								I	NADEQUAT		j
REMARKS:	ec M	TME 1	MAGA /D	ד די	PT (N)	אוד ב	Λ D 3	/1 D	DND ACC	TCMME	NT
IUA AUKILI	W		MADA/R		LLUM		$-\pi$	/ LK	FILE VOC	LUIVILL	AT

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-279		NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	ARCS 279 MANIFOLD 4, ISC			
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAI FLIGH		ANCY SCREENS	,	CIL ITEM
HDW/FU		В	C	
NASA [3 /1F IOA [3 /1F		[P] [P] P]	[x] *
COMPARE [/] []	[] []	[N]
RECOMMENDATIONS:	(If different	t from NASA)	ı	
[3 /1F	t] [P]	[P] [[A] DD/DELETE)
* CIL RETENTION	RATIONALE: (If a		ADEQUATE VADEQUATE	[]
REMARKS: IOA RECOMMENDS TO A PPP, 1/1 APON ONE MANIFOLD OMS OR ARCS DUMPONT RESULTING IN POSCONSTRAINTS OR TO A PO	BORT AND PLACED OF MAY RESULT IN THE PS DURING RTLS OF SSIBLE VIOLATIONS	ON THE CIL. HE INABILITY R TAL, S OF ENTRY N	LOSS OF A TO COMPLI MASS PROPE	ALL THRUSTERS ETE ADEQUATE

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	: 1/01/88 RCS-280 03-2A-2	01080-1		NASA DATA BASELINE NEW						
SUBSYSTEM: MDAC ID: ITEM:	ARCS 280 MANIFOL									
LEAD ANALYST:	C.D. PR	UST								
ASSESSMENT:										
CRITICA FLIG		REDUNDAN	CY SCREEN	S	CIL ITEM					
	UNC	A	В	C	IIEM					
NASA [2 /1 IOA [2 /1	R] [R] [F] [P] [F] [NA] [P] P]	[X] * [X]					
COMPARE [/] [и] [и] [1	[]					
RECOMMENDATIONS	: (If d	ifferent	from NASA)						
[2 /1	R] [F] [F .] [[A] DD/DELETE)					
* CIL RETENTION	RATIONAL	E: (If ap	_	ADEQUATE NADEQUATE						
REMARKS: IOA AGREES WITH	NASA/RT	RATTONAT.E	FOR FATI	TRE OF A AN	ND B SCREENS.					
IOA RECOMMENDS	THAT "POP	PET FAILS	OPEN" BE	ADDED AS	A FAILURE					
MODE ON THIS FM	EA. THIS	IS A CRE	DIBLE MOD	E AND IS A	DDRESSED ON					
OTHER QD FMEAS.	THE SSM	AGREED W	ITH THE I	OA ISSUE.	DECADOTAC					
IOA ALSO RECOMM FIRE/EXPLOSION	HAZARD AN	NG STATEM	TO GROUND	AND EVA C	REWS.					
THE QUANTITY ON	THIS FME	A APPEARS	TO BE IN	CORRECT.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		1080-3				ASA DATA BASELINE NEW			
	ARCS 281 MANIFOLD	4, GR	OUND.	PURG	E/DR	AIN COUE	PLING	, - 1 , 1	
LEAD ANALYST:	C.D. PRU	ST							
ASSESSMENT:									
CRITICAL FLIGH HDW/FU	T	REDUND A	ANCY B		ENS C	· · · · · · · · · · · · · · · · · · ·	CII		
NASA [3 /3 IOA [3 /3] []	[]	[[]]] *	
COMPARE [/] []	ſ]	[1	[] .	
RECOMMENDATIONS:	(If di	fferen	t fr	om NA	SA)				
[3 /3.] []	[]	[] (2	[ADD/E] ELETE)	
* CIL RETENTION	RATIONALE	: (If	appl	icabl	A	DEQUATE	_]	
REMARKS: IOA FAILURE MODE COUPLE" AND "RES FLOW" BE ADDED A CREDIBLE MODE AN THE SSM AGREED W THE QUANTITY ON	TRICTED F S A FAILU D IS ADDR ITH THE I	LOW". RE MOD ESSED OA ISS	IOA E ON ON O UE.	RECO THIS THER	MMEN FME QD F	IDS THAT IA. THIS MEAS.	"RES	TRICTE	-

ASSESSME ASSESSME NASA FME	NT	II	D:	RC	5-28	2	02:	140	-2			-					DAT SELIN NI	1E	[x		
SUBSYSTE MDAC ID: ITEM:				283		LI) !	5,	ISO	L	VI	Δ										
LEAD ANA	LYS	ST	:	c.I	D. F	R	JS:	r														
ASSESSME	NT	:																				
		FI	ICAL LIGH	r			RI A		INDA	NC	CY B	so	CREE	NS	c					L EM	[
W) C)			•							_		,		_		1			r		,	
NASA IOA	[3	/1R]		[P]			NA]		[P]			[]	•
COMPARE	[/N]		[N]		[N]		[N]		,	[]	
RECOMMEN	DA'	ric	ONS:		(If	di	Ĺf	fer	ent	. 1	fro	m	NASZ	A)								
•	[/]		[]		[]		[]	((AI		DE		ETE)
* CIL RE	TEI	T	ION 1	RAT:	ANOI	LE	€:	(I	f a	pr	pli	.ca	•		AI IAI	DEQ	UATE UATE	2 2	[]	
REMARKS: IOA AGRE	ES	W	ITH I	NAS	A/RI	F	RA:	rio	NAL	E	FC	R	3/11	R	PN	1P	ASSI	GN	ME	NT	•	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-283 03-2A-2021	140-1		NASA DATA BASELINI NEV						
SUBSYSTEM: MDAC ID: ITEM:	ARCS 283 MANIFOLD 5									
LEAD ANALYST:	C.D. PRUST	י								
ASSESSMENT:										
CRITICAL		EDUNDANCY	SCREEN	rs	CIL ITEM					
FLIGH HDW/FU		В		С	TIBH					
NASA [2 /2 IOA [2 /2] [] [] []	[X] *					
COMPARE [/] [] [] [1	[]					
RECOMMENDATIONS:	(If diff	ferent fro	om NASA	.)						
[/] [] [] [] (2	[ADD/DELETE)					
* CIL RETENTION	RATIONALE:	(If appl:		ADEQUATE	[] []					
REMARKS: NO DIFFERENCES. OF MISSION DUE T	IOA RECOMM O HIGHER PF	MENDS THAT ROP CONSUI	r THE " MPTION	C" EFFECTS WITH PRCS	s DISCUSS LOSS					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-284 03-2A-201080-1	NASA D BASEL	ATA: INE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM:	ARCS 284	ound purge/drain c	OUPLING
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
FLIGH'	ITY REDUNDA I NC A		CIL ITEM
NASA [2 /1R IOA [2 /1R] [F]] [P]	[F] [P] [NA] [P]	[X] *
COMPARE [/] [N]	[и] [и]	[]
RECOMMENDATIONS:	(If different	from NASA)	
[2 /1R] [F]	[F] [P]	[A] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If a	pplicable) ADEQUA INADEQUA	TE [] TE []
IOA RECOMMENDS TO MODE ON THIS FME	HAT "POPPET FAIL A. THIS IS A CR	E FOR FAILURE OF S OPEN" BE ADDED EDIBLE MODE AND I	AS A FAILURE S ADDRESSED ON
IOA ALSO RECOMMENTATION HE	NDS ADDING STATE AZARD AND HAZARD	WITH THE IOA ISSU MENTS TO THE EFFE TO GROUND AND EV S TO BE INCORRECT	CTS REGARDING A CREWS.

ASSESSME ASSESSME NASA FME					•	080-	-3			IASA BASE		[
SUBSYSTE MDAC ID:	M:			ARC 285	S					RAIN	COUP	LING	<u>.</u> -	
LEAD ANA	LY	ST	:	C.D	. PRUS	T		-						
ASSESSME	NT	:												
	CR		ICAI LIGH		R	EDUN	IDANCY	SCI	REENS			CII	_	
]			ЛС	A		٠В		c	2		111	2141	
NASA IOA	[3 3	/3 /3]	[]	[]	[]		[]	*
COMPARE	[/]	[.]	C]	[]		[]	
RECOMMEN	'DA'	ΓI	ons:	: (If dif	fere	ent fro	om N	IASA)					
		3	/3]	[]]	[]	(A	[DD/I) ELF	ETE)
* CIL RE	TE	NT	ION	RATI	ONALE:	(If	appl	icak	A	DEQU]	
REMARKS: IOA FAIL COUPLE" FLOW" BE CREDIBLE THE SSM	AN A M AG	D DD OD RE	"RES ED A E AN	TRIC AS A ND IS VITH	TED FL FAILUR ADDRE THE IO	OW". E MC SSEC A IS	IOA DE ON O ON O'S SUE.	REC THI THEF	OULD I COMMEN IS FME R QD F	NCLU IDS T IA. MEAS	DE " HAT THIS	FAII "RES	TRI	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-286 03-2A-2023	112-1		NASA DATA: BASELINE NEW	
	ARCS 286 MANIFOLD	ISOL VLVS			
LEAD ANALYST:	C.D. PRUS	r			
ASSESSMENT:			•		
CRITICAL FLIGH	ITY R	EDUNDANCY	SCREENS	3	CIL ITEM
HDW/FU	-	В		С	
NASA [1 /1 IOA [1 /1] [] [] []	[X] * [X]
COMPARE [/] [] [] []	[]
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)		
[1 /1] [] [] [] (AI	[A] DD/DELETE)
* CIL RETENTION	RATIONALE:	(If appl		ADEQUATE IADEQUATE	
REMARKS: THIS FMEA/CIL CO THE PRIMARY MANI THIS FAILURE MOD DISCUSS THE POSS PROP VAPORS. NA OR EXTERNAL LEAK ELSEWHERE. THE TO THE PROP LINE	FOLD ISOLA' E, HOWEVER IBLE EXPOS SA/RI DO NO AGE OF THE SSM AGREED	TION VALV DOES REC URE OF EV OT COVER VALVE HO THAT THI	ES. IOA OMMEND I A AND GF STRUCTUF USING ON S VALVE	A HAS NO IS THAT THE EI ROUND CREWS RAL FAILURI THIS FMEA BODY SHOUL	SSUE WITH FFECTS TO PROP OF E, RUPTURE, A OR LD BE ADDED

CORRESPONDING RETENTION RATIONALE.

i **E**---

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-286A	.: [] []					
	ARCS 286 MANIFOLD ISOL						
LEAD ANALYST:	C.D. PRUST						
ASSESSMENT:							
FLIGH'	ITY REDUNI I NC A	DANCY SCRE B	ens C	CIL			
NASA [1 /1 IOA [1 /1] []		[]	[X] *			
COMPARE [/] []	[]					
RECOMMENDATIONS:	(If differe	nt from NA	SA)				
[1/1] []	[]		[A] ADD/DELETE)			
* CIL RETENTION	. d=1	applicabl	ADECUATE	[]			
REMARKS: THIS FMEA/CIL COVERS ONLY THE BELLOWS LEAKAGE FAILURE MODE FOR THE VERNIER MANIFOLD ISOLATION VALVE. IOA HAS NO ISSUE WITH THIS FAILURE MODE, HOWEVER DOES RECOMMEND THAT THE EFFECTS DISCUSS THE POSSIBLE EXPOSURE OF EVA AND GROUND CREWS TO PROP OR PROP VAPORS. NASA/RI DO NOT COVER STRUCTURAL FAILURE, RUPTURE, OR EXTERNAL LEAKAGE OF THE VALVE HOUSING ON THIS FMEA OR ELSEWHERE. THE SSM AGREED THAT THIS VALVE BODY SHOULD BE ADDED TO THE PROP LINE EXTERNAL LEAKAGE FMEA (03-2A-202108-1) WITH CORRESPONDING RETENTION RATIONALE.							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-287	NASA DAT BASELIN NE	A: E [] W []
	ARCS 287 MANIFOLD ISOL VL	vs	
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
FI.TGH	ITY REDUNDAN T NC A		CIL ITEM
			[x] *
COMPARE [N /N] [] [] []	[N]
RECOMMENDATIONS:	(If different	from NASA)	
[2/2] [] [] [] ([A] ADD/DELETE)
* CIL RETENTION I	RATIONALE: (If ap	plicable) ADEQUATE INADEQUATE	[]
NASA/RI DO NOT CO WITHDRAWS 1/1 CRI PROP TO A THRUSTI THAT THE RESTRICT FMEA/CIL. THE SS TO 03-2A-202120-3 03-2A-202140-1 (3 RECOMMENDS A 3/11	IT, BUT MAINTAINS ER COULD RESULT I TED FLOW FAILURE SM AGREED THAT TH 3 (3/1R PPP) FOR 2/2) FOR VERNIER R PPP, 1/1 ABORT	MODE (RESTRICTED CONCERN THAT REST N BURN-THROUGH. IN MODE BE ADDRESSED OF IS FAILURE MODE SHOP PRIMARY MANIFOLD VA MANIFOLD VALVES. IN FOR 03-2A-202120-3 271, 275, AND 279.	RICTED FLOW OF OA RECOMMENDS ON THE OULD BE ADDED ALVES, AND TO HOWEVER, IOA

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	DCC-288	1/01/88 NASA DATA: RCS-288 BASELINE 03-2A-221308-1 NEW				
MDAC ID:	ARCS 288 JET ALIGN	MENT	BELLC	WS, P	RIMARY, ALL	AXES
LEAD ANALYST:	C.D. PRUS	T		escale s		
ASSESSMENT:	. <u>.</u> .					
CRITICAL		REDUND	ANCY	SCREE	NS	CIL ITEM
FLIGH HDW/FU	IT INC A	L	В		С	112.
NASA [1 /1 IOA [1 /1] []	[]	[]	[X] *
COMPARE [/] []	[]	[]	[]
RECOMMENDATIONS	(If dia	fferen	t fro	om NAS	A)	
, , , , , ,]. []	Ţ.]	[] (A)	[] ADD/DELETE)
* CIL RETENTION	RATIONALE	(If	appli	icable) ADEQUATE INADEQUATE	
REMARKS: IOA RECOMMENDS VALVE RELIEF DE THIS FMEA WITH	VICE FAILU	RE TO	RELI	EVE" E	E ADDED AS	AND "ISOL CAUSES ON

IOA ALSO RECOMMENDS THAT THE EFFECTS INCLUDE POSSIBLE EXPOSURE OF

EVA AND GROUND CREWS TO PROP OR PROP VAPORS.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-289		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:		BELLOWS,	PRIMARY, ALL	AXES
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICALI FLIGHT	TY REDUNI	DANCY SCRE	EENS	CIL ITEM
	IC A	В .	C ••••••	
NASA [/ IOA [1 /1] []	[]		[
COMPARE [N /N] []	[]	[]	[N]
RECOMMENDATIONS:	(If differer	nt from NA	SA)	
[/] []	[]	[]	[] DD/DELETE)
* CIL RETENTION F	ATIONALE: (If	applicabl	e) ADEQUATE INADEQUATE	[]
REMARKS: NASA/RI DO NOT CO NOW CONSIDERS THE BE QUESTIONABLE. MODE IN THE FMEA/	CREDIBILITY OF TOA DOES NOT CIL TO BE AN C	F RESTRIC REGARD TH PEN ISSUE	RESTRICTED FI TED FLOW IN A E ABSENCE OF	LOW). IOA A BELLOWS TO THIS FAILURE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-290 03-2A-221310-1	1/01/88 NASA DATA: RCS-290 BASELINE 03-2A-221310-1 NEW				
SUBSYSTEM: MDAC ID: ITEM:	ARCS 290 THRUSTER BIPROP S	SOLENOID VLVS, PRIM	ARY, ALL AXES			
LEAD ANALYST:	C.D. PRUST					
ASSESSMENT:						
CRITICAL FLIGH	ITY REDUNDANC	Y SCREENS	CIL			
	NC A	в с	ITEM			
NASA [3 /1R IOA [1 /1] [F] [P] [P]	[X] *			
COMPARE [N /N] [N] [и] [иј	[.]			
RECOMMENDATIONS:	(If different f	rom NASA)				
[1 /1] [] [] [] (AI	[A] DD/DELETE)			
* CIL RETENTION	RATIONALE: (If app					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-291 NONE				DATA: ELINE NEW	ſ]
SUBSYSTEM: MDAC ID: ITEM:	ARCS 291 THRUSTER	BIPROP S		o vivs,	PRIMA		ALL AXES
LEAD ANALYST:	C.D. PRUS	r					
ASSESSMENT:							
CRITICALITY REDUNDANCY SCREENS CIL							
FLIG HDW/F	INC A	A B		C.			••
NASA [/ IOA [1 /1] [] []	[]		[x] *
COMPARE [N /N] [] []	[]		[N]
RECOMMENDATIONS	(If dif	ferent :	from NA	SA)			
[1 /1] [] [1	[]	(Al		ELETE)
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []							
REMARKS: NASA/RI DO NOT RUPTURE, EXTERN SHOULD BE ADDED	AL LEAKAGE) TO THE PRO	. THE	SSM AGR EXTERNA	EED THA L LEAKA	GE FM	S VA	TAE BODA

ASSESSMENT D ASSESSMENT I NASA FMEA #:	D: R						ASA DAT BASELIN NE]
SUBSYSTEM: MDAC ID: ITEM:	2	RCS 192 PHRUSTER	BIPROF	o soi	ENOII) AF/	/s, PRI	MARY,	ALL AXES
LEAD ANALYST	: c	.D. PRUS	т						
ASSESSMENT:									
	TICALIT		EDUNDA	NCY	SCREE	ens		CIL ITE	
нс	W/FUNC	: A		В		С			
NASA [IOA [1	/] /1]	[]	[]	[]	[x] *
COMPARE [N	и/и]	[]	[]	[]	[N]
RECOMMENDATI	ons:	(If dif	ferent	fro	m NAS	5 A)			
[3	3 /1R]	[F	']	[P]	[P] (A] ADD/D	ELETE)
* CIL RETENT	TION RA	TIONALE:	(If a	ppli	cable		EQUATE	r	1
						INAL	EQUATE	, []
REMARKS: NASA/RI DO N WITHDRAWS 1/ PROP COULD R RESTRICTED F THE SSM AGRE 221310-4 (3/ ABORT FOR 03 AND 297.	1 CRIT RESULT FLOW FA EED THA 1R FPP	O, BUT MA IN BURN- AILURE MO AT THIS F O). HOWE	INTAIN THROUG DE BE AILURE VER, I	SH. ADDE MOI	NCERN IOA F RESSEI DE SHO RECOMM	RESTR THA RECOM O ON OULD MENDS	RICTED AT REST MENDS THE FM BE ADD	FLOW) RICTE THAT EA/CI ED TO R FPP	. IOA D FLOW OF THE L. 03-2A- , 1/1

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-293 03-2A-221310-4		NASA DATA BASELINE NEV	v [x]
SUBSYSTEM: MDAC ID: ITEM:			VLVS, PRIM	MARY, +X AXIS
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
FLIGH	ITY REDUND T NC A	ANCY SCREE	C	CIL ITEM
NASA [3 /1R IOA [3 /1R] [F]] [P]	[P] [P]	[P] [P]	[X] *
COMPARE [/] [N]	[]	[]	[N]
RECOMMENDATIONS:	(If differen	t from NAS	A)	
[3 /1R] [F]	[P]	[P]	[] ADD/DELETE)
* CIL RETENTION	RATIONALE: (If		ADEQUATE	[]
REMARKS: IOA AGREES WITH RECOMMENDS THAT FPP, 1/1 ABORT. OR TAL ABORT WOU DUMPING CAPABILI DUMPS COULD RESU	THIS ITEM AND F THE LOSS OF ON LD RESULT IN RE TY. INABILITY LT IN VIOLATION	AILURE MODE PRIMARY DUCED OMS TO COMPLET S OF ENTRY	DE BE UPGRAI THRUSTER DU AND RCS PRO E PLANNED C MASS PROPI	DED TO A 3/1R JRING AN RTLS DP DMS AND RCS ERTIES
CONSTRAINTS AND	PROP TANK LANDI	NG WEIGHT	CONSTRAINTS	5.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-294 03-2A-221310-1	NZ I	ASA DATA: BASELINE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM:	ARCS 294 THRUSTER BIPROI	P SOLENOID VL	'S, PRIMARY, +X AXIS
LEAD ANALYST:	C.D. PRUST		
ASSESSMENT:			
FLIGH	ITY REDUNDA T NC A	ANCY SCREENS B C	CIL ITEM
NASA [3 /1R IOA [1 /1] [F]] []	[P] [P] [X] *
COMPARE [N /N] [N]	[N] [N] []
RECOMMENDATIONS:	(If different	from NASA)	
[1 /1] []	[] [] [] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If a	1. 15	EQUATE [] EQUATE []
TO A 1/1 BECAUSE 22206, A SINGLE I CLASSIFIED AS A 1 THE VEHICLE, AND	IT RESULTS IN T FAILURE WHICH RE 1/1. PROP LEAKA GROUND CREW.	LEAKAGE FAIL THE LEAKAGE OF SULTS IN PROP GE IS A HAZAR	URE MODE BE UPGRADED PROP. PER NSTS LEAKAGE SHOULD BE
BE A 3/1R FPP, 1/	/1 ABORT. SEE A	SSESSMENT SHE	ET RCS-293.

ASSESSMENT ASSESSMENT NASA FMEA	T DATE: T ID: #:	1/01/8 RCS-29 03-2A-	8 5 221	310)-4					DATA: ELINE NEW	[]	
SUBSYSTEM MDAC ID: ITEM:	•	ARCS 295 THRUST						D VL	vs,	PRIMA	\RY	7,	Y	AXIS
LEAD ANAL	YST:	C.D. P	RUS	T										
ASSESSMEN'	T:													
C	RITICAL FLIGH		F	EDU	JNDAN	CY	SCRE	ENS			CI	L EM	ſ	
	HDW/FU		A			В		С					-	
NASA IOA	[3 /1R [3 /1R]	[F	,]]	P P]	[P]		[X]	*
COMPARE	[/]]	[N	[]	[]	[]		[N]	
RECOMMEND	ATIONS:	(If	dif	fer	rent	fr	om NA	SA)		.*				
	[3 /1R	1	[F	']	. [P]	[P]		[DD/			ETE)
* CIL RET	ENTION	RATIONA	LE:	(1	If ap	pl.	icabl	λ	DEQI DEQI	UATE UATE	[]	
REMARKS: IOA AGREE RECOMMEND FPP, 1/1 OR TAL AB DUMPING C DUMPS COU CONSTRAIN	S THAT ABORT. ORT WOU APABILI LD RESU	THIS IT THE LO LD RESU TY. IN LT IN V	EM SS LT AB] IO]	ANI OF IN LIT	O FAI ONE REDU TY TO	PR CE COF	RE MC IMARY D OMS OMPLE ENTR	AILUR DDE B THR THR S AND TE P	E OI E UI USTI RCI LANI	F A SOPERADI PGRADI ER DUI S PROI NED OI PROPEI	CRI ED RIN P MS	EEN TO IG AN	I. AN ND	RTLS

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-296 03-2A-221310-1	1/01/88 NASA DATA RCS-296 BASELINI 03-2A-221310-1 NET				
SUBSYSTEM:	ARCS 296 THRUSTER BIPROP		VLVS, PRIMA	ARY, Y AXIS		
LEAD ANALYST:	C.D. PRUST					
ASSESSMENT:						
FLIGH'	ITY REDUNDA T NC A	NCY SCREENS B	s C	CIL ITEM		
NASA [3 /1R IOA [1 /1] [F]] []	[P] [[] [P]	[X] *		
COMPARE [N /N] [N]	[и]	N]	[]		
RECOMMENDATIONS:	(If different	from NASA)	<u>-</u>		
[1 /1] []	נ ז נ) (AD	[] DD/DELETE)		
* CIL RETENTION	RATIONALE: (If a		ADEQUATE NADEQUATE	[]		
REMARKS: 10A RECOMMENDS TO TO A 1/1 BECAUSE 22206, A SINGLE TO CLASSIFIED AS A THE VEHICLE, AND FROM A LOSS OF TO	IT RESULTS IN TO FAILURE WHICH RES 1/1. PROP LEAKAG GROUND CREW. HRUSTER STANDPOIN	HE LEAKAGE SULTS IN PI GE IS A HA! NT, IOA COI	OF PROP. ROP LEAKAGE ZARD TO EVA NSIDERS THI	PER NSTS E SHOULD BE A CREW, IS FAILURE TO		
BE A 3/1R FPP, 1,	/1 ABORT. SEE A	SSESSMENT S	SHEET RCS-2	295.		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-297 03-2A-221310-4	NZ I	ASA DATA: BASELINE [] NEW [X]
SUBSYSTEM: MDAC ID:	ARCS 297		VS, PRIMARY, Z AXIS
LEAD ANALYST:	C.D. PRUST	•	
ASSESSMENT:			
FLIGHT			ITEM
HDW/FUN	1C A	ВС	
NASA [3 /1R IOA [3 /1R] [F]	[P] [P [P] [P] [X] *] [].
COMPARE [/] [N]] [] [N]
RECOMMENDATIONS:	(If different	from NASA)	
[3 /1R] [F]	[P] [P] [] (ADD/DELETE)
* CIL RETENTION I	RATIONALE: (If ap	oplicable) AI INAI	DEQUATE [] DEQUATE []
REMARKS:	INCN/DT DATTONATI	ומוודגק מסף	E OF A SCREEN. IOA
RECOMMENDS THAT TFPP, 1/1 ABORT.	THIS ITEM AND FAI THE LOSS OF ONE	LURE MODE BI PRIMARY THRU	E UPGRADED TO A 3/1F USTER DURING AN RTLS
OR TAL ABORT WOULDUMPING CAPABILITY	LD RESULT IN REDUTY. INABILITY TO	JCED OMS AND COMPLETE PI	RCS PROP LANNED OMS AND RCS
DUMPS COULD RESULT CONSTRAINTS AND I			

ASSESSMENT DATE: ASSESSMENT ID:	1/01/88 RCS-298 03-2A-221310-1]											
NASA FMEA #:	03-2A-221310-1	NEW [x]										
	ARCS 298 THRUSTER BIPROP S	SOLENOID VLVS, PRIMAR	RY, Z AXIS										
LEAD ANALYST:													
ASSESSMENT:													
CRITICAL FLIGH		CY SCREENS C											
	NC A	В С	ITEM										
NASA [3 /1R IOA [1 /1] [F] [P] [P] [X] *										
COMPARE [N /N] [N][и] [и] []										
RECOMMENDATIONS:	(If different f	from NASA)											
	1 [1 [] [] [ADD] D/DELETE)										
* CIL RETENTION	RATIONALE: (If app	olicable) ADEQUATE [INADEQUATE []										
REMARKS:	HAT THE INTERNAL I	LEAKAGE FAILURE MODE											
TO A 1/1 BECAUSE	IT RESULTS IN THE	E LEAKAGE OF PROP. P JLTS IN PROP LEAKAGE	PER NSTS										
	CLASSIFIED AS A 1/1. PROP LEAKAGE IS A HAZARD TO EVA CREW, THE VEHICLE, AND GROUND CREW.												
FROM A LOSS OF T	HRUSTER STANDPOINT	T, IOA CONSIDERS THIS SESSMENT SHEET RCS-29											
	, -		· ·										

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-299 NONE		NASA DATA BASELINE NEW	[]
MDAC ID:	ARCS 299 JET ALIGNMEN	T BELLOWS,	VERNIER, ALL	AXES
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAL	· ·	EENS	CIL ITEM	
FLIGH HDW/FU		В	С	IIEM
NASA [/ IOA [1 /1] []	[]	[]	[] * [X]
COMPARE [N /N] []	[]	[]	[и]
RECOMMENDATIONS:	(If differ	rent from NA	ASA)	
[/] []	[]	[] (A	[DD/DELETE)
* CIL RETENTION	RATIONALE: ([f applicab]	le) ADEQUATE INADEQUATE	[]
REMARKS: THERE ARE NO ALI LINES.	GNMENT BELLOV	S ON THE VE	ERNIER THRUST	ER PROP

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-300 NONE		NASA BASE		[]	
	ARCS 300 JET ALIGNM	MENT BELI	Lows, v	ERNIER,	ALL	AXE	s
LEAD ANALYST:	C.D. PRUST	r.					
ASSESSMENT:							
	ITY RE	CIL					
FLIGH HDW/FU	-	I	3	С		ITE	M
NASA [/ IOA [1 /1] [] []	[]		[x] *]
COMPARE [N /N] [] [1	[]		[N]
RECOMMENDATIONS:	(If diff	erent fi	com NAS	SA)			
[/	1 . [1	1,	[]	(AI	[DD/D] ELETE)
* CIL RETENTION	RATIONALE:	(If app	licable	ADEQÜ ADEQÜ INADEQU		Ţ	
REMARKS: THERE ARE NO ALIC LINES.	GNMENT BELI	LOWS ON T	THE VER	-		•	ROP

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-301 03-2A-231310	-3	NASA DATA: BASELINE NEW				
SUBSYSTEM: MDAC ID: ITEM: AXES	301		VLVS, VERNI	ERS, ALL			
LEAD ANALYST:	C.D. PRUST						
ASSESSMENT:							
CRITICAL: FLIGHT	TY REDU	NDANCY SCREE		CIL ITEM			
HDW/FUI		В	С				
NASA [3 /1R IOA [1 /1] [F]] []	[P] []	[P] []	[X] * [X]			
COMPARE [N /N] [n]	[N]	[N]	[]			
RECOMMENDATIONS:	(If differ	ent from NAS	A)				
.[1 /1	1 [1	[]	[] (AD	[] D/DELETE)			
* CIL RETENTION 1) ADEQUATE INADEQUATE	[]			
REMARKS: IOA FAILURE MODES ON". IOA RECOMMI UPGRADED TO A 1/1 NSTS 22206, ANY S SHOULD BE CLASSII CREW, VEHICLE, AN FROM A LOSS OF VI FAILURE TO BE A 2 LOSS OF MISSION.	S ON ANALYSIS ENDS THAT THE L BECAUSE IT SINGLE FAILUR FIED AS A 1/1 ND GROUND CRE ERNIER THRUST 2/2, SINCE LO IOA ALSO RE	SHEET SHOUL FAILED OPEN RESULTS IN L E WHICH RESU . PROP LEAK W. ER STANDPOIN SS OF VERNIE COMMENDS THA	D NOT INCLUD FAILURE MOD EAKAGE OF PR LTS IN PROP AGE IS A HAZ T, IOA CONSI RS RESULTS I T THE SUBASS	E "FAILS E BE OP. PER LEAKAGE ARD TO EVA DERS THIS N PROBABLE EMBLY ITEMS			
INCLUDED ON THIS	FMEA BE SEPARATED ONTO INDIVIDUAL FMEAS.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-302 03-2A-231	.310-1			TA: NE [] EW [X]						
SUBSYSTEM: MDAC ID:	ARCS 302			VLVS, VE	RNIERS, ALL						
LEAD ANALYST:	C.D. PRUS	ST.									
ASSESSMENT:											
CRITICAL FLIGH HDW/FU				ns C	CIL ITEM						
·		1 [1	r 1	(X)*						
NASA [2 /2 IOA [2 /2	jį] [j	įį	[X] * [X]						
COMPARE [/] [] []	[]	[]						
RECOMMENDATIONS:	(If dif	ferent fr	om NAS	A)							
[/	1, [] []	[]	[] (ADD/DELETE						
* CIL RETENTION	RATIONALE:	(If appl) ADEQUAT INADEQUAT							
NO DIFFERENCES.	EMARKS: D DIFFERENCES. IOA RECOMMENDS THAT THE SUBASSEMBLY ITEMS										

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-303				SA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM: AXES		BIPROP S	olenoi	D VLV	s, vern	IERS, ALL
LEAD ANALYST:	C.D. PRUS	r				
ASSESSMENT:		•				
CRITICAL FLIGHT	CIL ITEM					
	NC A		В	С		
NASA [/ IOA [1 /1] [] []			[x] *
COMPARE [N /N] [] []	[]	[N]
RECOMMENDATIONS:	(If dif	ferent f	rom NA	SA)		
[1 /1] [) []	[] (A)	[] DD/DELETE)
* CIL RETENTION 1	RATIONALE:	(If app	licabl	AD	EQUATE	[]
INADEQUATE [] REMARKS: NASA/RI DO NOT COVER THIS FAILURE MODE (STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE). THE SSM AGREED THAT THIS VALVE BODY SHOULD BE ADDED TO THE PROP LINE EXTERNAL LEAKAGE FMEA (03-2A- 202108-1) WITH CORRESPONDING RETENTION RATIONALE.						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/01/88 RCS-304 03-2A-231310-3		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM: AXES	ARCS 304 THRUSTER BIPRO		D VLVS, VERN	IERS, ALL
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
FLIGH	ITY REDUNDA T NC A	ANCY SCRE	ENS C	CIL ITEM
NASA [3 /1R IOA [1 /1] [F]] []	[P] []	[P] []	[X] * [X]
COMPARE [N /N] [N]	[N]	[N]	[]
RECOMMENDATIONS:	(If differen	t from NA	SA)	
[1 /1] []	[]	[] (A	[] DD/DELETE)
* CIL RETENTION	RATIONALE: (If	applicabl	e) ADEQUATE INADEQUATE	[]
REMARKS: IOA RECOMMENDS TO A 1/1 BECAUSE ANY SINGLE FAILU CLASSIFIED AS A PROP LEAKAGE IS FROM A LOSS OF V FAILURE TO BE A	IT RESULTS IN RE WHICH RESULT: 1/1. A HAZARD TO EVA ERNIER THRUSTER	LEAKAGE O S IN PROP CREW, VE STANDPOI	F PROP. PER LEAKAGE SHO HICLE, AND G NT, IOA CONS	NSTS 22206, ULD BE ROUND CREW. IDERS THIS
LOSS OF MISSION. INCLUDED ON THIS	IOA ALSO RECO	MMENDS TH	AT THE SUBAS	SEMBLY ITEMS

ASSESSMENT ASSESSMENT NASA FMEA #	DATE: ID:	1/01/88 RCS-305 03-2A-2	3 5 23131(DATA: LINE [NEW [: [] '[x]									
SUBSYSTEM: MDAC ID: ITEM: AXES		ARCS 305		PROP SOI										
LEAD ANALYS	T:	C.D. PF	D. PRUST											
ASSESSMENT:														
	TICALI FLIGHT		REDU	JNDANCY	SCREE		Т	IL TEM						
H	IDW/FUN	ic	. A	В		C								
NASA [IOA [2 /2 1 /1] [[]	[]	[]] [X X] *]					
COMPARE [n /n) [[]	[]	[]	[]					
RECOMMENDAT	cions:	(If d	differ	rent fro	om NASA	1)								
[/] [[]	. [] [[]] LETE)					
* CIL RETEN	TION F	RATIONAI	Œ: ()	If appli	•	3 BEAT	יאוחובי ר		1					
					1	ADEQU NADEQU	ATE []					
REMARKS: IOA WITHDRA FLOW TO A T VERNIER THR ASSIGNMENT. IOA RECOMME BE SEPARATE	HRUSTER RUSTER ENDS TH	ER COULI STANDPO IAT THE	RESU DINT, SUBAS	JLT IN E IOA AGE SSEMBLY	BURN-TH REES WI	ROUGH.	FROM NASA/	RI	LOSS OF 2/2					

1000000		500 3	~ ~	312-1		_	BASEL	NE	[]			
ASSESSMENT DATE: 1/01/88													
LEAD ANA	LYST:		c.D.	PRUS	т						=		
ASSESSME	NT:												
ASSESSMENT ID: RCS-306													
				A		В	,	C	2				
	[1 [1	/1 /1]	[]	[[]	[[]		<pre>{] {]</pre>	[]	*
COMPARE	[/]	[]	Ι]	[]		[]	
RECOMMEN	DATIC	NS:	(If	dif	ferer	nt fr	om N	ASA)					
	[/	1	[]	[]	[]	(A	[DD/I] ELE	TE)
		ON	RATION	ALE:	(If	appl	icab)	Z]	
	RENCE						T TH	E FAI	LURE 1	IOD:	ES C)И Т	HIS

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-306A 03-2A-221	313-1			SA DATA ASELINE NEW						
SUBSYSTEM: MDAC ID: ITEM: PRIMARY, ALL AXES	306 THRUSTER										
LEAD ANALYST: C.D. PRUST											
ASSESSMENT:											
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM											
HDW/FU		F	3	С		IIIM					
NASA [1 /1 IOA [1 /1] [] []	[]]	[X]	*				
COMPARE [/] [] []	[]	[]					
RECOMMENDATIONS:	(If dif	ferent fr	om NA	SA)							
[/] [] []] (AI	[] DD/DELET	TE)				
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE [] REMARKS:											
NO DIFFERENCES. INCLUDE "STRUCTU			T FAI	LURE 1	MODES ON	THIS I	FMEA				

ASSESSME ASSESSME NASA FME	NT I		RCS-3	07	310-2				ASA D BASEI		[x]	
SUBSYSTE MDAC ID: ITEM: VERNIER,		AXE		TER	сомви	STIO	n cha	MBER	OR N	ozzi	Œ]	EXTI	ENSION
LEAD ANA	LYST	:	C.D.	PRUS	T								- <u>-</u>
ASSESSME	NT:												
		ICAL LIGH	ITY	R	EDUND	ANCY	SCRE	ENS			CII	_	
	NC	A		В	ı	С	С			rivi			
NASA IOA	[1	/1 /1]	[]	[]	[]		[]	X] X]	*
COMPARE	[/]	[]	[J	[]		[]	
RECOMMEN	DATI	ons:	(If	dif	feren	t fr	om NA	SA)					•
	[/]	[]	ĺ]	[]	(AE	[D/I] DELI	ETE)
* CIL RE	TENT	ION	RATION	ALE:	(If	appl	icabl		DEQUA	ישיחי	г	1	. 1
									DEQUA		[j	
REMARKS: NO DIFFE INCLUDE IOA ALSO	"STR	UCTU	RAL FA	ILUR									
FMEA BE								TTE.	MI CIN	CTOT	'EU	ON	TUTO

ASSESSME ASSESSME NASA FME	NT NT A	D? II #:	ATE: O:	1/0 RC: 03	1/01/88 NAS RCS-10001X B2 03-2F-101060-1										[•	
				FRO 100 PR	001	JRE	F	RELIE	ef as	SE	MBLY	?						
LEAD ANALYST: C.D. PRUST																		
ASSESSMENT:																		
	CRI						RE	EDUNI	DANCY	S	CREE	ens				L CEN	<i>I</i> T	
	UBSYSTEM: DAC ID: TEM: EAD ANALYST: SSESSMENT: CRITIC FLI HDW/ NASA [1 / IOA [1 / OMPARE [/ CIL RETENTION ECOMMENDATION [/ CIL RETENTION EMARKS: O DIFFERENCES HE EFFECTS RE ROPERTIES CON				r NC A B					C					•			
NASA IOA	[1	/1 /1]		[]	[]		[]		[X X]	*
COMPARE	[/]		[]	[]		[]		[]	
RECOMMEN	DA?	rio	ons:		(If	di	ff	fere	nt fr	om	NAS	SA)						
	[/]		[.]	[]		[1	(AE	[D/	/DI] ELH	ETE)
* CIL RE	ION	RAT:	IONZ	ALE	:	(If	appl	ic	able	A	DEQUATI DEQUATI	E	[)]			
THE EFFE	REI	3 1	REGA	RDI	NG I	POS	S	BLE	VIOL	AΤ	IONS	OF	ORBIT	ER	Eì	IT F	RY	MASS

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-1000 NONE)2X		NASA DATA BASELINE NEW				
MDAC ID:	FRCS 10002 HE ISOL	VLV						
LEAD ANALYST:	C.D. PRO	JST						
ASSESSMENT:								
CRITICALI FLIGHT		REDUNDANG	CY SCREEN	S	CIL ITEM			
	NC	A	В	С	* * ##*			
NASA [/ IOA [2 /1R] [P] [F] [F]	[x] *			
COMPARE [N /N] [N] [N] [N]	[N]			
RECOMMENDATIONS:	(If di	ifferent 1	from NASA)				
[2 /1R] [P] [F] [F] (Al	[A] DD/DELETE)			
* CIL RETENTION I	RATIONALI	E: (If app	•	2 DEOUZ ME	[]			
• • • • • • • • • • • • • • • • • • • •								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-100	03X			NASA DATA BASELINE NEW				
MDAC ID:	FRCS 10003 HE ISOL								
LEAD ANALYST:	C.D. PRI								
ASSESSMENT:									
CRITICAL FLIGH	REDUNDA	ANCY	SCREE	NS	CIL ITEM				
	NC	A	В		С				
NASA [/ IOA [1 /1] []	[]	[]	[] * [X]			
COMPARE [N /N] []	[]	[]	[N]			
RECOMMENDATIONS:	(If d	ifferen	t fro	m NAS	A)				
[1 /1] []	[3	[] (A	[A] DD/DELETE) ·			
* CIL RETENTION	* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []								
REMARKS: NASA/RI DO NOT COVER THIS FAILURE MODE (STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE). THE SSM AGREED THAT THIS VALVE BODY SHOULD BE ADDED TO THE HELIUM LINE EXTERNAL LEAKAGE FMEA (03-2F- 101013-1) WITH CORRESPONDING RETENTION RATIONALE.									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-10004 03-2F-101	1/01/88 NASA DATA RCS-10004X BASELINI 03-2F-101030-1 NEV					
	FRCS 10004 HE PRESS	REGULATOR AS	SSEMBLY				
LEAD ANALYST:	EAD ANALYST: C.D. PRUST						
ASSESSMENT:							
CRITICAL FLIGH	CREENS	CIL					
HDW/FU	NC A	В	C.				
NASA [3 /1R IOA [3 /1R] [P] [F]] [F]	[P] [P]	[X] * [X]			
COMPARE [/] [] []	[]	[]			
RECOMMENDATIONS:	(If dif	ferent from	NASA)				
[, ,/] [] []	[]	[] DD/DELETE)			
* CIL RETENTION RATIONALE: (\(\begin{array}{c} \text{f applicable}\) & ADEQUATE [] INADEQUATE []							
REMARKS: NO DIFFERENCES. ABOUT POSSIBLE V							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-10005X 03-2F-101095-3	NASA DATA: BASELINE [] NEW [X]						
SUBSYSTEM: MDAC ID: ITEM:	FRCS							
LEAD ANALYST:	C.D. PRUST							
ASSESSMENT:								
FLIGH'	ITY REDUNDANCY SCREEN T NC A B	C CIL ITEM						
NASA [2 /1R IOA [1 /1] [P] [P] [] [] [P] [X] * [X]						
COMPARE [N /N] [N] [N] [и] []						
RECOMMENDATIONS:	(If different from NASA)						
[1 /1] [] [] [] [] (ADD/DELETE)						
	RAT ONALE: (If applicable)	ADEQUATE [] NADEQUATE []						
REMARKS: NASA/RI ORIGINALLY DID NOT COVER THIS FAILURE MODE (BLOCKAGE OF SINGLE INLET FILTER). HOWEVER, SSM ADDED A NEW FMEA/CIL (03-2F-101095-3, 2/1R PPP) FOR THIS FAILURE MODE AS A RESULT OF AN IOA ISSUE. IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 1/1. INABILITY TO REPRESS A FRCS PROP TANK AND SUBSEQUENT INABILITY TO USE OR DEPLETE FRCS PROP COULD RESULT IN VIOLATIONS OR ENTRY MASS PROPERTIES CONSTRAINTS AND LOSS OF LIFE OR VEHICLE DURING ENTRY.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-1000)6X			NASA DATA BASELINE NEW				
SUBSYSTEM: MDAC ID: ITEM:	FRCS 10006 QUAD CHE	ECK VALV							
LEAD ANALYST:	C.D. PRU	JST							
ASSESSMENT:									
FLIGH'	ITY T NC		NCY B	SCREEN	s c	CIL			
NASA [/ IOA [1 /1] []	[] []	[[x] *]		
COMPARE [N /N] []	[] [1	[N	1		
RECOMMENDATIONS:	(If di	ifferent	fro	om NASA)				
[1 /1] []	[j [] . (A	A] DD/D] ELETE)		
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []									
REMARKS: NASA/RI DO NOT COVER THIS FAILURE MODE (STRUCTURAL FAILURE, RUPTURE, EXTERNAL LEAKAGE). THE SSM AGREED THAT THIS VALVE BODY SHOULD BE ADDED TO THE HELIUM LINE EXTERNAL LEAKAGE FMEA (03-2F- 101013-1) WITH CORRESPONDING RETENTION RATIONALE.									
IOA ALSO RECOMME INCLUDED ON THE AND GROUND CREWS	NDS THAT FMEA (COF	THE EFF	FECTS	OF PO	SSIBLE PRO	P LE	AKAGE BE RE OF EVA		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-10007X 03-2F-101060-	2	NASA DATA: BASELINE [] NEW [X]			
SUBSYSTEM:	FRCS 10007 PRESSURE RELI		e bri			
LEAD ANALYST:	C.D. PRUST					
ASSESSMENT:						
CRITICAL: FLIGHT	CIL ITEM					
HDW/FUI	the contract of the contract o	В	C .	TIEM		
NASA [2 /1R IOA [2 /1R] [P]] [P]	[NA] [[KN]	P] P]	[X] * [X]		
COMPARE [/] []	[] []	[]		
RECOMMENDATIONS:	(If differe	nt from NASA)		·		
[/] [,]	[] [] (Al	[] DD/DELETE)		
* CIL RETENTION 1	RATIONALE: (If		ADEQUATE IADEQUATE			
REMARKS: NO DIFFERENCES. ABOUT POSSIBLE VICONSTRAINTS. DUI OF POSSIBLE PROP OF EVA AND GROUNI	IOLATIONS OF O E TO INABILITY LEAKAGE (CORRO	S ADDING STAT RBITER ENTRY TO DUMP FRCS	TEMENTS TO MASS PROPI PROP, ANI	THE EFFECTS ERTIES O THE EFFECTS		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-100			NASA DATA BASELINE NEW				
SUBSYSTEM: MDAC ID: ITEM:	10008	10008 PRESSURE RELIEF ASSEMBLY						
LEAD ANALYST:	C.D. PR	C.D. PRUST						
ASSESSMENT:								
CRITICAL FLIGH HDW/FU	T	REDUNDA A	ANCY SCREEN	ıs C	CIL ITEM			
•				_				
NASA [/ IOA [3 /1R		F]	[] [[NA] [P]	[X] *			
COMPARE [N /N] [и ј	[N]	[и]	[N]			
RECOMMENDATIONS:	(If d	ifferent	from NASA	٧)				
[3 /1R	1 [F]	[NA] [[P]	[A] DD/DELETE)			
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE []								
			. 1	NADEQUATE	į			
REMARKS:			/2-					
NASA/RI DO NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). THE SSM AGREED THAT RESTRICTED FLOW SHOULD BE ADDED TO THE FAILURE								
MODES ON 03-2F-1								

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ASSESSM ASSESSM NASA FM	ENT ENT EA #	DATE: ID: :	1/01/ RCS-1 03-2F	/01/88 CS-10009X 3-2F-101060-1					BASELII NI]	
SUBSYST: MDAC ID			FRCS 10009 PRESS		RELI	EF AS	SEMB	SLY				
LEAD AN	ANALYST: C.D. PRUST											
ASSESSM	ENT:											
		FLIGHT	r							CIL		
	H	DW/FUI	NC.	A	L	В		C	is receive <u>s s</u> ari	-1 1 I		
NASA IOA	[[1 /1 1 /1]	[]	[[]	[]	[X] *	
COMPARE	[/]	[]	[]	[]	[]	
RECOMME	NDAT	ions:	(If	dif	fere	nt fr	om N	(ASA)				
	[1 /1]	[]	[]	[3	A] (ADD/D)
* CIL R	ETEN'	TION !	RATION	ALE:	(If	appl:	icab	ole)				
		-						INA	DEQUATI DEQUATI]]	
ADEQUATE [] INADEQUATE [] REMARKS: THIS FMEA COVERS ONLY THE BELLOWS LEAKAGE FAILURE MODE. IOA HAS NO ISSUE WITH THIS FAILURE MODE, HOWEVER DOES RECOMMEND ADDING STATEMENTS TO THE EFFECTS ABOUT POSSIBLE VIOLATION OF ENTRY MASS PROPERTIES CONSTRAINTS AND THE HAZARDS OF PROP LEAKAGE TO EVA CREW, VEHICLE, AND GROUND CREW. NASA/RI DO NOT COVER STRUCTURAL FAILURE, RUPTURE, OR EXTERNAL LEAKAGE OF THE VALVE HOUSING ON THIS FMEA OR ELSEWHERE. THE SSM AGREED THAT THIS VALVE BODY SHOULD BE ADDED TO THE PROP LINE EXTERNAL LEAKAGE FMEA (03-2F-102108-1) WITH CORRESPONDING RETENTION RATIONALE.												

ASSESSMENT ASSESSMENT NASA FMEA	ID:	1/01/8 RCS-10 03-2F-	010X	0-3	NASA DAT. BASELIN NE				[x]	
SUBSYSTEM: MDAC ID: ITEM:		FRCS 10010 PROP T	ANK I	sol VI	.VS 1/2	2 & 3	/4/5					
LEAD ANALY	ST:	C.D. I	PRUST									
ASSESSMENT	:											
CR	ITICAL:						CIL ITEM					
1	HDW/FUI		A		В	C	•	1	**	. 1,1,1		
	3 /3 1 /1]	[]]]	[.]		[x] *	
COMPARE [N /N]	[]	[]	[]		[N]	
RECOMMENDA'	TIONS:	(If	diffe	rent f	rom NA	ASA)					aller vive ev	
	2 /1R]	[P]	[NA]	[P]	(AD		A DE] LETE	:)
* CIL RETE	NTION I	RATIONA	ALE: (If app	licabl	A	DEQUAT DEQUAT		[]	
REMARKS:	ends ti	HAT TH	S ITE	M AND	FAILUE	RE MO	DE BE	UPG	RA	DE	D TO)

IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 2/1R PNP AND PLACED ON THE CIL. THIS FAILURE COULD RESULT IN OVERPRESSURIZATION AND RUPTURE OF DOWNSTREAM PROP LINES, AND IS LISTED AS A CAUSE ON THE PROP LINE EXTERNAL LEAKAGE FMEA (03-2F-102108-1) AND AS A FAILURE MODE ON 03-2A-202140-3. IOA NOW CLASSIFIES THIS FAILURE AS A 2/1R PNP SINCE A PREVIOUS FAILURE IS REQUIRED BEFORE THE VALVE WILL BE CLOSED.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-10011X	NASA DATA: BASELINE NEW						
MDAC ID:	FRCS 10011 PROP TANK ISOL VLVS 1/2 &	3/4/5						
LEAD ANALYST:	C.D. PRUST							
ASSESSMENT:								
CRITICAL: FLIGHT		CIL ITEM						
		c	11511					
NASA [/ IOA [2 /1R] [] [] [] [P] [P] [p]	[] * [X]					
COMPARE [N /N] [N] [N] [и ј	[и]					
RECOMMENDATIONS:	(If different from NASA)						
[/] [] [] [] (ADI	[] D/DELETE)					
* CIL RETENTION	RATIONALE: (If applicable)							
	ı	ADEQUATE NADEQUATE	[] [] .					
REMARKS: NO ISSUE. NASA/RI DO NOT COVER THIS FAILURE MODE (FAILS MIDTRAVEL), HOWEVER THE WORST-CASE EFFECTS OF THIS FAILURE ARE COVERED BY THE FAILED CLOSED AND RESTRICTED FLOW FAILURE MODES.								

ASSESSME ASSESSME NASA FME		1/01/ RCS-1 03-2F	0012]
SUBSYSTE MDAC ID:		FRCS 10012 MANIF		1-4	ISOLA	TION	VALV	ES		
LEAD ANA	LYST:	C.D.	PRUS	T						
ASSESSME	NT:									
	ITY REDUNDANCY SCRE				EENS			CIL ITEM		
	FLIGH HDW/FU		A		E	3	C		111	714
NASA IOA	[3 /3 [1 /1]	[]	[]	[]] .] *
COMPARE	[N /N]	[]	[]	[]	[]	1]
RECOMMEN	DATIONS:	(If	dif	fere	nt fr	om N	ASĀ)			
	[1 /1	1	[j	[]	[ADD/I	A] DELETE)
* CIL RE	TENTION	RATION	ALE:	(If	appl	icab		DEOUZME	-	7
	rung end							DEQUATE DEQUATE	-]
REMARKS:	MMENING T	שת העם	TC T	тъм	א מאג	יו דד גי	DF MO	OF BF II	ם בים אור	עד חבר

IOA RECOMMENDS THAT THIS ITEM AND FAILURE MODE BE UPGRADED TO A 1/1 AND PLACED ON THE CIL. THIS FAILURE COULD RESULT IN OVERPRESSURIZATION AND RUPTURE OF DOWNSTREAM PROP LINES, AND IS LISTED AS A CAUSE ON THE PROP LINE EXTERNAL LEAKAGE FMEA (03-2F-102108-1) AND AS A FAILURE MODE ON 03-2A-202140-3.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-100:	13X	NASA DATA: BASELINE NEW					
MDAC ID:	FRCS 10013 MANIFOLI	0 1-4 IS	ALVES					
LEAD ANALYST:	C.D. PRI	C.D. PRUST						
ASSESSMENT:								
CRITICAL FLIGH	ns	CIL ITEM						
HDW/FU		A	В	С				
NASA [/ IOA [2 /1R] [P]	[] [P]	[P]	[x] *			
COMPARE [N /N] [и ј	[N]	[и]	[N]			
RECOMMENDATIONS:	(If d	ifferent	: from NAS	A)				
[/] [1	[]	[] (AI	[] DD/DELETE)			
* CIL RETENTION	RATIONALI	E: (If a	pplicable					
••	men e e e e e			ADEQUATE INADEQUATE				
REMARKS: NO ISSUE. NASA/RI DO NOT COVER THIS FAILURE MODE (FAILS MIDTRAVEL), HOWEVER THE WORST-CASE EFFECTS OF THIS FAILURE ARE COVERED BY THE FAILED CLOSED AND RESTRICTED FLOW FAILURE MODES.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-10014 NONE	x		NASA DASEL	ATA: INE [NEW []
MDAC ID:	FRCS 10014 MANIFOLD	5 ISOLATI	ON VAL	.VE		
LEAD ANALYST:	C.D. PRUS	Т				
ASSESSMENT:						
FLIGH	ITY R			NS	CIL	
HDW/FU	NC A		3	С		F.T
NASA [/ IOA [1 /1] [] []	[]	[[x] *
COMPARE [N /N] [] []	[]	[И]
RECOMMENDATIONS:	(If dif	ferent fr	om NAS	A)		
[2 /1R	[P] []	IA]	[P]	[A (ADD/D	ELETE)
	RATIONALE:	(If appl		e) ADEQUA' INADEQUA'	TE []
REMARKS: NASA/RI DO NOT C RELIEVE). IOA R ITEM AND FAILURE OVERPRESSURIZATI LISTED AS A CAUS FAILURE MODE ON IOA NOW CLASSIFI FAILURE IS REQUI	ECOMMENDS MODE. TH ON AND RUP E ON THE P 03-2A-2021 ES THIS FA	THAT A 2/ IS FAILUF TURE OF I ROP LINE 40-3. ILURE AS	'1R PNP RE COUL DOWNSTR EXTERN A 2/1R	CIL BE LO RESULT REAM PROPULATION OF THE PROPULATIO	CREATED IN LINES, GE FMEA CE A PR	FOR THIS AND IS AND AS A

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-10019 03-2F-121	5X 1310-3		NASA DATA: BASELINE NEW	[x]
MDAC ID:	FRCS 10015 THRUSTER	BIPROP S	OLENOID V	VALVE, PRIM	MARY, +Z AXIS
LEAD ANALYST:	C.D. PRUS	ST			
ASSESSMENT:					
CRITICAL FLIGH	ITY I	REDUNDANC	Y SCREENS		CIL ITEM
	NC 1	A	В	C	ITEM
NASA [3 /1R IOA [3 /2R] []	F] [F] [P] [P] [P] P]	[X] * [X]
COMPARE [/N] [] [] [1	[]
RECOMMENDATIONS:	(If di	fferent f	rom NASA)	ı	
[3 /2R] []	F] [P] [[A] D/DELETE)
* CIL RETENTION 1	RATIONALE:	: (If app	·	ADEQUATE JADEQUATE	
REMARKS:				~	. ,
IOA CONSIDERS TH					
OTHER. IOA CONS: 3/2R FPP. THE +: DUMPING.		RS ARE NO	T REQUIRE		
03-2F-121310-3 II CRITICALITY ASSIG	NCLUDES TH	IRUSTERS	IN ALL AX		E

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-10016X NONE	ζ		NASA DATA BASELINE NEW	-
MDAC ID:	FRCS 10016 THRUSTER E	BIPROP SO	LENOID V	LV, PRIMA	RY, ALL AXES
LEAD ANALYST:	C.D. PRUST	ŗ			
ASSESSMENT:					<u> </u>
CRITICAL: FLIGH	ITY RE	EDUNDANCY	SCREENS	;	CIL ITEM
	NC A	В		С	11211
NASA [/ 10A [1 /1] [] [] []	[
COMPARE [N /N) [] [] [1 .	[N]
RECOMMENDATIONS:	(If diff	erent fro	om NASA)		
[/	1 [) [] [[] DD/DELETE)
* CIL RETENTION 1	RATIONALE:	(If appli	1 22114	ADEQUATE ADEQUATE	[]
REMARKS: NO HDW ISSUE. TO COULD ONLY BE CAN ASSESSED BY TOA	JSED BY AN	EPDC (RJI	REMATURE D) FAILU	OPERATION THE	N, FAILS ON)

ASSESSME ASSESSME NASA FME	NT	II	D:		10017	X			N	IASA BASE	DATA: LINE NEW	[]	
SUBSYSTE MDAC ID: ITEM: AXES	M:				FRCS 10017 THRUSTER BIPROP SOLENOID VALVE, VE							NI)	ER,	. A]	 LL
LEAD ANA	LYS	ST:	:	C.D.	PRUS'	r									
ASSESSME	NT:	:													
	CR		ICAL LIGH	ITY	R	EDUND	ANCY	SCI	REENS				IL CEN	ſ	
	I		W/FU		A		E	3	C	:	•	-		•	
NASA IOA	[1	/1]	[]	[[]	[]]	x] ;	k
COMPARE	[N	/N]	[1	[]	[]		[N]	
RECOMMEN	DA'	ric	ons:	(I	f dif	feren	t fr	om 1	NASA)						
	[/]	C	.]	[]	[]	(AI	[DD,	/DI] ELE:	ΓE)
* CIL RE		T	ION	RATIO	NALE:	(If	appl	icak	A	DEQU		[]	
REMARKS: NO HDW I COULD ON	SSU	B	E CA	USED	BY AN	EPDC	RJ	D) I	FAILUF						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-10018X		nasa da Baseli N	
	FRCS 10018 THRUSTER INJE	CTOR HEAD		
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICALI FLIGHT	ITY REDUN	DANCY SCRI	EENS	CIL ITEM
	NC A	В	С	11211
] []		-	[] * [x]
COMPARE [N /N] []	[]	[]	[и]
RECOMMENDATIONS:	(If differen	nt from N	ASA)	
[1 /1	1 . [1,	[].	[]	[A] (ADD/DELETE)
* CIL RETENTION E	RATIONALE: (If	applicabl	le) ADEQUAT	
DEMADEC.			INADEQUAT	
REMARKS: NASA/RI DO NOT COFLOW), HOWEVER, NOT COME THE SAME LEVER COVERED ON INDIVIDUATION. RESTRICTED FLOW OF THROUGH.	NOTE ON 03-2F- AND ADDED AS HAT THIS ITEM THE CIL WITH L OF DETAIL WITH IDUAL FMEAS, A	121312-1 S A CAUSE ON AND FAILUN A 1/1 CRIT TH OTHER T ND SHOULD	SAYS THAT T N 03-2F-121 RE MODE BE FICALITY. THRUSTER CO ALSO RECEI	HE INJECTOR 312-1. ADDRESSED THE INJECTOR IS MPONENTS VE 1/1

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-10019X NONE		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 10019 THRUSTER IN	JECTOR HEAD	ASSEMBLY, PR	IMARY
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
FLIGH'	ITY RED I NC A		EENS C	CIL ITEM
NASA [/ IOA [1 /1			[]	[] * [x]
COMPARE [N /N] []	[]	[]	[N]
RECOMMENDATIONS:	(If diffe	rent from NA	ASA)	
[1 /1	ı ı i	[]		[A] DD/DELETE)
* CIL RETENTION I	RATIONALE: (If applicabl	e) ADEQUATE INADEQUATE	[]
REMARKS: NASA/RI DO NOT CO FAILURE, BURN-THE THE INJECTOR FME 121312-1. IOA RECOMMENDS TI INDEPENDENTLY ON AT THE SAME LEVE	ROUGH), HOWE A WAS DELETE HAT THIS ITE THE CIL WIT	VER, NOTE ON D AND ADDED M AND FAILUF H A 1/1 CRIT	N 03-2F-12131 AS A CAUSE O RE MODE BE AD FICALITY. TH	2-1 SAYS THAT N 03-2F- DRESSED E INJECTOR IS
COVERED ON INDIVI-		AND SHOULD		

	ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-100: NONE	20X		NASA DA'I BASELIN NE	YA: ME[] WW[]
	SUBSYSTEM: MDAC ID: ITEM:	ARCS 10020 HE ISOL	VLV			
	LEAD ANALYST:	C.D. PRI	UST			
	ASSESSMENT:					
	CRITICAL: FLIGH	יי		ANCY SCRI		CIL ITEM
						r 1 ±
	NASA [/ IOA [2 /1R	;	P]	[F]	[F]	[X]
	COMPARE [N /N] (и ј	[N]	[N]	[N]
	RECOMMENDATIONS:	(If d	ifferent	t from NA	ASA)	
	[2 /1R] [P]	[F]	[F]	[A] [ADD/DELETE)
	* CIL RETENTION	RATIONAL	E: (If a	applicabl		
-					ADEQUATE INADEQUATE	
	REMARKS: NASA/RI DO NOT CORECOMMENDS THAT 'FMEA/CIL AS A 2/	THE REST 1R PFF.	RICTED I	FLOW MODE	E BE ADDRESS EPRESS ARCS	ED ON THE PROP TANK AND
	INABILITY TO USE ENTRY CONTROL AND	D VIOLAT	IONS OF	ENTRY MA	ASS PROPERTI	ES CONSTRAINT
	AND PROP TANK LA	NDING WE	IGHT CO	NSTRAINTS	LOSS OF	FLOW THROUGH

ONE VALVE NOT DETECTABLE DURING DUAL LEG OPERATION, AND CONTAMINATION CAN AFFECT BOTH VALVES SIMULTANEOUSLY.

THE SSM AGREED THAT RESTRICTED FLOW MODE SHOULD BE ADDED TO 03-2A-201020-1 (2/1R PPP), HOWEVER IOA MAINTAINS 2/1R PFF POSITION.

ASSESSME ASSESSME NASA FME	NT NT A #	D? II	ATE:	1/01/ RCS-1 NONE	88 002	21X			1	NASA BASE	DATA: LINE NEW	: []	
SUBSYSTEM MDAC ID: ITEM:	M:			ARCS						·					
LEAD ANA	LYS	T:	:	C.D.	PRU	JST									
ASSESSME	NT:														
(CRI	T	CAL	ITY		REDUN	DANCY	SCI	REENS			CI	L EM		
	H	IDV	i/FU	T NC		A	В		(2		11	. E.P	ı	
NASA IOA COMPARE	[1	/1]	[]	[]	[]		[x]	*
COMPARE	[N	/N]	[]	[]	[]		[N]	
RECOMMEN	DAT	'IC	ons:	(If	đi	ffere	nt fro	om 1	NASA)						
	[1	/1	1	[]	[]	[]	(AI	[)D/	A 'DE] :LE	TE)
* CIL RE	TEN	T	ON	RATION	ALE	: (If	appl	ical	ole)					_	
									INA	ADEQU ADEQU	ATE ATE	[]	
REMARKS:														_	
NASA/RI	DO	NC	OT C	OVER T	HIS	FAIL	JRE MO	DDE	(STRU	CTUR	AL FA	II.	UF	Œ,	505
RUPTURE,	EX	TI	RNA	L LEAK	AGE	i). Ti	HE SSI	א א	FREED	THAT	THIS	5 V	AL	νE	RODA
SHOULD B												ME	A	(0	3-2A-
201013-1) W	17.3	H C	OKKESP	OND	ING RI	TIENT'	LON	KATIC	JNALE	•				

ASSESSMENT ASSESSMENT NASA FMEA	T II):	RCS-1	002	223	K 030-1						ASA DATA BASELINE NEV	E [x]	
SUBSYSTEM: MDAC ID: ITEM:			ARCS 10022 HE PR	ESS	5 F	REGUL	ΔTC	OR	ASSEM	(B)	ĽΥ					
LEAD ANALY	YST	:	c.D. 1	PRU	JST	נ										
ASSESSMENT	T:															
CI	FI	LIGH			RI	EDUNDA	NO		SCREE	ENS				IL TE		
	HDV	/FUI	NC		A			В			С					
		/1R /1R		[P P]	[F F]	[P P] .	[X X]	*
COMPARE	[/	J	[]	[]	[]	[]	
RECOMMENDA	ATIC	ons:	(If	di	Ĺfí	ferent	: 1	fro	om NAS	SA))					
•	C ,	/	1	[]	[]	[] (2)/D		ETE)
* CIL RET	ENTI	ION I	RATION	ALE	Ē:	(If a	ıpı	,1	icable	≥)						
		· · · · · ·							•	Il		DEQUATE DEQUATE]]]	
REMARKS: NO DIFFERI ABOUT POSS PROP TANK	SIBI	LE V	CLATIC	SNC	3 (OF ENT	'R	Z	MASS E							

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	RCS-10023X	95-3	NASA DATA BASELINE NEV	
SUBSYSTEM: MDAC ID: ITEM:	ARCS 10023 QUAD CHECK	VALVE ASSE	MBLY	
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICA FLIG HDW/F		DUNDANCY SO	C	CIL ITEM
NASA [1 /1 IOA [1 /1] []			[X] * [X]
COMPARE [/] []	[]	[]	[]
RECOMMENDATIONS	: (If diffe	erent from	NASA)	
[/] []	[]	[] (2	[] ADD/DELETE)
* CIL RETENTION	RATIONALE: ((If applica	ble) ADEQUATE INADEQUATE	
REMARKS: NASA/RI ORIGINA SINGLE INLET FI IOA RECOMMENDS VIOLATIONS OF E TANK LANDING WE	LTER), HOWEVE ADDING A STAT NTRY MASS PRO	ER ADDED 03 TEMENT TO T OPERTIES CO	-2A-201095-3 I HE EFFECTS ABO	PER IOA ISSUE OUT POSSIBLE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-10024			NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	ARCS 10024 QUAD CHEC	K VALVE A	SSEMBLY		
LEAD ANALYST:	C.D. PRUS	T			
ASSESSMENT:					
CRITICAL FLIGH	r	EDUNDANCY			CIL ITEM
HDW/FU	NC A	В		С	
NASA [/ IOA [1 /1] [] [] []	[x] *
COMPARE [N /N] [] [) [1	[N]
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)		
[, 1, /1] [] [) [] · (Al	[A] DD/DELETE)
* CIL RETENTION	RATIONALE:	(If appl	•	ADEQUATE ADEQUATE	
REMARKS:					•
NASA/RI DO NOT CO RUPTURE, EXTERNAL SHOULD BE ADDED	L LEAKAGE) TO THE HEL	. THE SS	M AGREED EXTERNAL	THAT THIS LEAKAGE	S VALVE BODY
201013-1) WITH CO IOA ALSO RECOMMEN	NDS THAT TI	HE EFFECT	S OF POS	SIBLE PROP	P LEAKAGE BE
INCLUDED ON THE I	FMEA (CORRO	OSION, FI	RE, EXPL	OSION, EXI	POSURE OF EVA

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-10025X	50-2	NASA DATA: BASELINE NEW	
	ARCS 10025 PRESSURE RE	ELIEF ASSEMBLY		
LEAD ANALYST:	C.D. PRUST			
ASSESSMENT:				
CRITICAL FLIGH		OUNDANCY SCREEN	rs .	CIL ITEM
	NC A	В	С	
NASA [2 /1R IOA [2 /1R] [P]] [NA] [] [NA] [P] P]	[X] * [X]
COMPARE [/] []] [] [1.	[]
RECOMMENDATIONS:	(If diffe	erent from NASA	7)	
[/] []] [] [] (AI	[DD/DELETE)
* CIL RETENTION	RATIONALE: (· · · · · · · · · · · · · · · · · · ·	ADEQUATE NADEQUATE	[]
REMARKS: NO DIFFERENCES. ABOUT POSSIBLE V CONSTRAINTS AND EFFECTS OF POSSI EXPOSURE OF EVA	IOLATIONS OF PROP TANK LA BLE PROP LEA	F ORBITER ENTRY ANDING WEIGHT (AKAGE (CORROSIC	MASS PROPI CONSTRAINTS	ERTIES , AND THE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-100	26X		NASA DATA BASELINE NEW					
SUBSYSTEM: MDAC ID: ITEM:	10026	E RELIEI	F ASSEMBLY	Y					
LEAD ANALYST:	C.D. PR	UST							
ASSESSMENT:									
CRITICAL FLIGH	CIL ITEM								
HDW/FU	NC	A	В	C					
NASA [/ IOA [3 /1R] [F]	[] [NA]	[] [P]	[x] *				
COMPARE [N /N] [n j	[N]	[N]	[и]				
RECOMMENDATIONS:	(If d	ifferent	from NAS	SA)					
[3 /1R] . [F]	[NA]	[P] (A)	[A] DD/DELETE)				
* CIL RETENTION I	RATIONALI	E: (If a	pplicable	-	,				
DENADUC.				ADEQUATE INADEQUATE	[]				
REMARKS: NASA/RI DO NOT COVER THIS FAILURE MODE (RESTRICTED FLOW). THE SSM AGREED THAT RESTRICTED FLOW SHOULD BE ADDED TO THE FAILURE MODES ON 03-2A-201060-3 (3/1R FNP, BURST DISK FAILS TO RUPTURE).									
		+ 75.2	LES I PALER APARTOR	r bros carret ar	AV STANSOF SET				

en de la companya de la companya de la companya de la companya de la companya de la companya de la companya de La companya de la companya de la companya de la companya de la companya de la companya de la companya de la co

ASSESSME ASSESSME NASA FME	ENT ENT EA ;	DZ II #:	ATE:	1/01/3 RCS-10 03-2A	./01/88 CS-10027X 3-2A-201060-1					ASA DATA BASELINE NEW	[x]	
SUBSYSTE MDAC ID:	EM:			ARCS 10027 PRESSI					Y					
	LEAD ANALYST: C.D. PRUST ASSESSMENT:													
ASSESSME	SNT	:												
		F	LIGH'									IL CEM		
	I	HDV	/FU	NC	A		В		С					
NASA IOA	[1	/1 /1]	[]	[]	[]	[X X]	*
COMPARE	[/]	[1	[]	[]	[]	
RECOMMEN	VDA!	ric	ons:	(If	dif	feren	t fr	om NA	SA)					
	[1	/1]	[]	[]	[-	(A	DD/	A /DE] :LE	TE)
* CIL RI	rmeri	VIU.	TON 1	₽₩₩₽₽₩	λ T.Ε.•	(Tf	annl	i cahl	۱۵		-			
		NI.	LON	RATION	umn.	(11	аррт	reapr.		DEQUATE DEQUATE	[]	
REMARKS: THIS FMEA COVERS ONLY THE BELLOWS LEAKAGE FAILURE MODE. IOA HAS NO ISSUE WITH THIS FAILURE MODE, HOWEVER DOES RECOMMEND ADDING STATEMENTS TO THE EFFECTS ABOUT POSSIBLE VIOLATION OF ENTRY MASS PROPERTIES CONSTRAINTS AND THE HAZARDS OF PROP LEAKAGE TO EVA CREW, VEHICLE, AND GROUND CREW. NASA/RI DO NOT COVER STRUCTURAL FAILURE, RUPTURE, OR EXTERNAL LEAKAGE OF THE VALVE HOUSING ON THIS FMEA OR ELSEWHERE. THE SSM AGREED THAT THIS VALVE BODY SHOULD BE ADDED TO THE PROP LINE EXTERNAL LEAKAGE FMEA (03-2A-202108-1) WITH CORRESPONDING RETENTION RATIONALE.														

ASSESSMENT ID: 1	1/01/88 RCS-10028X NONE	NASA DATA: BASELINE [] NEW []
MDAC TD:	ARCS 10028 PROP TANK ISOL VLVS 3/4	1/5
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
FLIGHT		ITEM
HDW/FUNG	C A B	C
NASA [/ IOA [2 /1R] [] []] [P] [F]	[] [] * [F] [X]
COMPARE [N /N] - [и] [и]	[и] [и]
RECOMMENDATIONS:	(If different from NA	ASA)
[3 /1R] [P] [F]	[P] [A] (ADD/DELETE)
* CIL RETENTION RA	ATIONALE: (If applicabl	le) ADEQUATE [] INADEQUATE []
FAILURE MODE (REST MODE SHOULD BE ADD PFP FOR RESTRICTED VALVES. RESTRICTED DETECTABLE DURING	TRICTED FLOW). THE SSM DRESSED ON THE FMEA/CII D FLOW OF THE PROP TANK ED FLOW THROUGH ONE 3/4 DUAL LEG OPERATION. I CERN THAT RESTRICTED FI	NASA/RI DO NOT COVER THIS AGREED THAT THIS FAILURI L. IOA RECOMMENDS A 3/1R K ISOL 3/4/5

ASSESSMEN NASA FME	TV T A	II ‡:	ATE:	- / - / - / -					LINE NEW	[
SUBSYSTEM MDAC ID: ITEM:	1:			AR 10	CS 029			r ara			· =				
LEAD ANAI	LYS	5 T :	:	c.	D. P	RUS	T								
ASSESSME	NT:	;													
C	CRI		ICAL:		•	F	REDUN	DANCY	SC	REENS			CIL		
	ŀ		W/FU			A	L	В		C					
NASA IOA	[3	/3 /1]		[]	[]	[]		[x]	*
COMPARE	[N	/N]		[]	[]	[]		[N]	
RECOMMEN	DAT	ri(ons:		(If	dif	fere	nt fro	mc	NASA)					
	[2	/1R]		[F	P]	[N2	A]	[P]		[A DD/D		TE)
* CIL RE	ΓEI	T	ION :	RAT	'IONA	LE:	(If	appl	ica	A		JATE JATE	[]	
REMARKS: IOA RECOMMENDS THAT THIS FAILURE MODE BE UPGRADED TO A 2/1R PNP FOR THE 1/2 VALVE AND PLACED ON THE CIL. THIS FAILURE COULD RESULT IN OVERPRESSURIZATION AND RUPTURE OF THE DOWNSTREAM PROP LINES, AND IS LISTED AS A CAUSE ON THE PROP LINE EXTERNAL LEAKAGE FMEA (03-2A-202108-1) AND AS A FAILURE MODE ON 03-2A-202140-3. IOA NOW CLASSIFIES THIS FAILURE AS A 2/1R PNP SINCE A PREVIOUS FAILURE IS REQUIRED BEFORE THE VALVE WILL BE CLOSED.															

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-10030X 03-2A-202110-2	NASA DATA: BASELINE [] NEW [X]
SUBSYSTEM: MDAC ID:	ARCS	
LEAD ANALYST:	C.D. PRUST	
ASSESSMENT:		
FLIGH	ITY REDUNDANCY SCREEN T NC A B	S CIL ITEM C
NASA [3 /3 IOA [2 /1R] [] [] [] [P] [F]	p] [] *
COMPARE [N /N] [N] [N] [N] [N]
RECOMMENDATIONS:	(If different from NASA)
[_3 /1R] [P] [NA] [P] [] (ADD/DELETE)
	RATIONALE: (If applicable)	() ADEQUATE [] NADEQUATE []
FOR THE 3/4/5 VA OVERPRESSURIZATI IS LISTED AS A C (03-2A-202108-1) IOA NOW CLASSIFI	HAT THIS FAILURE MODE BE ULVE. THIS FAILURE COULD FOR AND RUPTURE OF THE DOWN AUSE ON THE PROP LINE EXTENDE AND AS A FAILURE MODE ON ES THIS FAILURE AS A 3/1R RED BEFORE THE VALVE WILL	ESULT IN STREAM PROP LINES, AND RNAL LEAKAGE FMEA 03-2A-202140-3. PNP SINCE A PREVIOUS

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-10031X		NASA DATA: BASELINE NEW	[]				
MDAC ID:	ARCS 10031 PROP TANK ISOL	VLV 1/2						
LEAD ANALYST:	C.D. PRUST							
ASSESSMENT:								
CRITICAL: FLIGHT	ŗ	NCY SCREENS	c c	CIL ITEM				
HDW/FUI	NC A	Б						
NASA [/ IOA [3 /1R] []]]	[P] [P]	[] *				
COMPARE [N /N] [N]	[и][и]	[]				
RECOMMENDATIONS:	(If different	from NASA)						
1 /] []	[] [[] DD/DELETE)				
* CIL RETENTION 1	RATIONALE: (If a	pplicable)	ADEQUATE IADEQUATE	[]				
REMARKS: NO ISSUE. NASA/I TRAVEL), HOWEVER	THE WORST-CASE	EFFECTS OF	THIS FAILU	RE ARE				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-10032X NONE	NASA DATA: BASELINE [] NEW []
SUBSYSTEM: MDAC ID: ITEM:	ARCS 10032 PROP TANK ISOL VLVS 3/4/	5
LEAD ANALYST:	C.D. PRUST	was a second
ASSESSMENT:		
CRITICAL: FLIGHT HDW/FUI		NS CIL ITEM C
] [] []]]]	[] [] * [P] []
COMPARE [N /N] [N] [N]	[и]
RECOMMENDATIONS:	(If different from NAS	A)
[/] [] []	[] [] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []
TRAVEL), HOWEVER	RI DO NOT COVER THIS FAIL THE WORST-CASE EFFECTS O AILED CLOSED AND RESTRICT	URE MODE (FAILS MID- F THIS FAILURE ARE

ASSESSMEN NASA FMEA	T ID:	RCS-100 03-2A-2	33X 02111-3		BASELINE NEW	
SUBSYSTEM MDAC ID: ITEM:	[:	ARCS 10033		VLVS 1/2	& 3/4/5	
LEAD ANAL	YST:	C.D. PR	UST			
ASSESSMEN	T:					
c	FLIGH'			ANCY SCRE	ENS C	CIL ITEM
NASA IOA	·			[] [F]	[] [P]	[] *
COMPARE	[/N] [N]	[N]	[N]	[N]
RECOMMEND	ATIONS:	(If d	ifferent	from NA	SA)	
	[3 /1R] [P]	[NA] _.	[P] (A	[] .DD/DELETE)
* CIL RET	ENTION 1	RATIONAL	E: (If a	applicable	e) ADEQUATE INADEQUATE	[]
REMARKS:						_
					E MODE (RELI THE LOSS O	
REDUNDANC	Y (OMS	RCS CR	OSSFEED	VALVE DE	VICES) COULD	
					EED LINES.	VEEDALA T
					PROP LINE E	
			,			

202140-3.

ASSESSMENT D ASSESSMENT I NASA FMEA #:	D:		RCS-10034X BASE					ASA DA BASELI	INE		-	
SUBSYSTEM: MDAC ID: ITEM:		ARCS 10034 RCS CE	Rossi	FEED '	vlvs	1/2 8	§ 3/	4/5				
LEAD ANALYST	:	C.D. I	RUS	r								
ASSESSMENT:												
CRITICALITY REDUNDANCY SCREENS FLIGHT									CIL			
_		NC	A		В		С			111	11	
NASA [IOA [2	/ /2]	[]	[] .	נ נ]		((x]	*
COMPARE [N	/N]	[]	[]	[]		[N]	
RECOMMENDATI	ons:	(If	dif	feren	t fro	om NAS	SA)					
	/]	[]	[] .	[]	(AI	[DD/D	ELE	ETE)
* CIL RETEN!	ION I	RATIONA	ALE:	(If	appli	icable	A.	DEQUAT	E	[]	
REMARKS: NO ISSUE. N TRAVEL), HOW COVERED BY T	EVER	THE WO	RST-	-CASE	EFFI	ECTS C	LURE OF T	HIS FA	(FA	AILS JRE	MI ARE	2

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/01/88 RCS-10035 03-2A-202	X 120-2		NASA DATA: BASELINE NEW	
	ARCS 10035 MANIFOLD				
LEAD ANALYST:	C.D. PRUS	T			
ASSESSMENT:					
CRITICAL FLIGHT	CIL ITEM				
HDW/FU	NC A	B	,	C	
NASA [3 /3 IOA [1 /1] [] [] []]	[] * [x]
COMPARE [N /N] [] [] [1	[N]
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)	
[2 /1R] [P] [N	'A] [P] (AI	[A] DD/DELETE)
* (IL RETENTION I	RATIONALE:	(If appl		ADEQUATE NADEQUATE	
REMARKS: IOA RECOMMENDS T	HAT THIS I	TEM AND F	'AILURE I	MODE BE UPO	GRADED TO A
2/1R PNP AND PLAC OVERPRESSURIZATION LISTED AS A CAUST	CED ON THE	CIL. TH	IIS FAIL	URE COULD I AM PROP LIM	RESULT IN NES, AND IS
(03-2A-202108-1) IOA NOW CLASSIFIE FATLURE IS REQUI	AND AS A ES THIS FA	FAILURE M	ODE ON O	03-2A-20214 PNP SINCE A	10-3.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		/01/88 NASA DATA: CS-10036X BASELINE [3-2A-202140-3 NEW [X							
SUBSYSTEM: MDAC ID: ITEM:	ARCS 10036 VERNIER	MANIFOLI	D ISOL V	ALVE					
LEAD ANALYST:	C.D. PRU	ST							
ASSESSMENT:									
CRITICAL: FLIGHT		REDUNDAI	CIL ITEM						
HDW/FUI		A	В	С	3 3 2 4 5 T				
NASA [1 /1 IOA [1 /1]	[]	[]	[X] *				
COMPARE [/] []	[]	[]	[,]				
RECOMMENDATIONS:	(If di	fferent	from NAS	SA)					
[, /] [J	[]	[]	[] ADD/DELETE)				
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []									
REMARKS: NO DIFFERENCES. IOA RECOMMENDS THAT THE EFFECTS DISCUSS THE POSSIBLE EXPOSURE OF EVA AND GROUND CREWS TO PROP OR PROP VAPORS.									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		7X	NASA DATA: BASELINE NEW	[]				
	ARCS 10037 MANIFOLD	1-4 IS	OL VALVES						
LEAD ANALYST:	C.D. PRU	ST				•			
ASSESSMENT:	ASSESSMENT:								
CRITICAL	CIL ITEM	r							
FLIGH HDW/FU		Α	B	C	TIEF	ı			
NASA [/ IOA [3 /1R] [p]	[] [[P]	P]	[] *			
COMPARE [N /N	j []	N]	[и]	и ј.	[]			
RECOMMENDATIONS:	(If di	fferent	from NASA)					
. [/] []	[] [] (AI	[DD/DE] :LETE)			
* CIL RETENTION	RATIONALE	: (If a	pplicable)						
err grame in			I	ADEQUATE NADEQUATE	[]			
REMARKS: NO ISSUE. NASA/RI DO NOT COVER THIS FAILURE MODE (FAILS MIDTRAVEL), HOWEVER THE WORST-CASE EFFECTS OF THIS FAILURE ARE COVERED BY THE FAILED CLOSED AND RESTRICTED FLOW FAILURE MODES.									

ASSESSME ASSESSME NASA FME	1/01, RCS- NONE	X			ľ	VASA BASE		[]			
SUBSYSTE MDAC ID: ITEM: AXES	M:		ARCS 1003 THRUS	0038 RUSTER BIPROP SOLENOID VALVE, PRI									ALL
LEAD ANA	LYST	:	C.D.	PRUS	T					•			
ASSESSME	NT:												
		ICAL LIGH	ITY	F	EDUN	DANC	SCR	EENS			CI		
			NC	A		I	3	C	2		11	E.P.	•
NASA IOA	[[1	/1]	[]	[]	[]] [x] *
COMPARE	[1	/N]	[]	[]	[]		[N]
RECOMMEN	DATIO	ons:	(I	f dif	fere	nt fi	com N	ASA)					
	[/]	[]	[]	[]	(A	[DD/	DE] LETE)
* CIL RE		ION	RATIO	NALE:	(If	app]	licab	1	ADEQU ADEQU		[]
REMARKS: NO HDW I COULD ON ASSESSED	SSUE.	E CA	USED :	BY AN	I EPD	C (Ri	JD) F	TURE	OPER	ATIO THE	N, RJD	FA S	AILS ON) ARE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-100393	ĸ	NASA DATA: BASELINE [] NEW []						
SUBSYSTEM: MDAC ID: ITEM:	ARCS 10039 THRUSTER I	BIPROP S	OLENOII) VLV	, VERNIE	ER, A	ALL AXES		
LEAD ANALYST:	C.D. PRUS	r		•					
ASSESSMENT:									
CRITICAL: FLIGHT	[TY RI	EDUNDANC	Y SCREE	ens		CIL			
	IC A		В	С		1157	1		
NASA [/ IOA [1 /1] [] []	[]	[x] * .		
COMPARE [N /N] [] []	[]	[N]		
RECOMMENDATIONS:	(If dif	ferent f	rom NAS	SA)					
[/] [] []	[] (AI	[DD/DI] ELETE)		
* CIL RETENTION I	RATIONALE:	(If app	licable	AD	EQUATE EQUATE	[]		
REMARKS: NO HDW ISSUE. THE COULD ONLY BE CAU ASSESSED BY IOA	JSED BY AN	EPDC (R	JD) FAI						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	RCS-10040X NONE		BASELINE NEV	
	ARCS 10040 THRUSTER INJE	CTOR HEAD	ASSY, PRIMAF	RY
LEAD ANALYST:	C.D. PRUST	-		
ASSESSMENT:			•	
CRITICAL FLIGH	ITY REDUN	DANCY SCRE	ENS	CIL ITEM
HDW/FU		В	С	4 4 200
NASA [/ IOA [1 /1] []	[]	[]	[x] *
COMPARE [N /N] . []	[]	[]	[N]
RECOMMENDATIONS:	(If differe	ent from NA	SA)	
[1 /1] []	[]	[]	[A] ADD/DELETE)
* CIL RETENTION	•	applicabl	e) ADEQUATE INADEQUATE	[]
REMARKS: NASA/RI DO NOT C IOA RECOMMENDS T THE FMEA/CIL WIT LEVEL OF DETAIL	HAT THIS ITEM H A 1/1 CRITIC AS OTHER THRUS	AND FAILUR CALITY. TH STER COMPON	RE (RESTRICT E MODE BE AL E INJECTOR I ENTS WHICH A	TED FLOW). DDRESSED ON IS AT THE SAME ARE
COVERED ON INDIV ATTENTION. REST THRUSTER BURN-TH	RICTED FLOW OF	THE INJEC	TOR COULD RI	ESULT IN

ASSESSME ASSESSME NASA FME	ENT I	D:	RCS-1	38 0041	x			ASA DAT BASELIN NE						
SUBSYSTE MDAC ID: ITEM:			10041			ror i	HEAD A	ASSY	, PRIMA	RY				
LEAD ANA	LYST	•	C.D. 1	PRUS'	r									
ASSESSME	ENT:					•				-		. ,		
		ICAL: LIGH'	ITY	R	EDUND	ANCY	SCRE	ENS			CI IT			
			NC	A		В		С			*+	TOT.	L	
NASA IOA	[[1	/ /1]	[]]]	[[]		[X]	*
COMPARE	[N	/N	1	[]	[]	[]		[N]	
RECOMMEN	DATI	ONS:	(If	dif	feren	t fro	om NAS	SA)						
	[1	/1]	[]	[]	[] ([D/			TE)
* CIL RE		ION 1	RATION	ALE:	(If a	appli	icable	AI	DEQUATE DEQUATE	:	[]	
REMARKS: NASA/RI IOA RECO THE FMEA LEVEL OF COVERED ATTENTIC	DO NO MMENI CIL DETI ON II	DS TI WITI AIL Z NDIV	HAT THI H A 1/1 AS OTHI IDUAL I	IS I'. L CR: ER TI FMEA	TEM AI ITICAI HRUSTI , AND	ND FA LITY. ER CO SHOU	AILURI THI MPONI JLD AI	RE (F E MOI E INJ ENTS LSO F	RESTRIC DE BE A JECTOR WHICH RECEIVE	TE DD IS AR	D RE: A' E	FI SS T	OW EC TH	ON E SAME

ASSESSME ASSESSME NASA FME	NT NT A	D I #:	ATE: D:	1/01/ RCS-1 NONE	88 004:	2X					DATA ELINE NEW]	
SUBSYSTE MDAC ID: ITEM: AXES				10042	0042 IRUSTER BIPROP SOLENOID VALVE, PRI									LL
LEAD ANA	LY	ST	: '	C.D.	PRUS	ST								
ASSESSME	NT	:												
		F	LIGH						REENS			CII		
]	HD	W/FU	NC	7	A	E	,	C	3				
NASA IOA	[[1	/1]	[]	ָר []	[]		[[X] :]	*
COMPARE	[N	/N]	[)	[]	[]		[N]	
RECOMMEN	DA'	ri.	ons:	(If	di	ffere	nt fr	om 1	VASA)					
	[1	/1]	[]	[]	[]		[A DD/D		TE)
* CIL RE	TE	NT	ION	RATION	ALE:	: (If	appl	icak	A		JATE JATE]	
REMARKS: NASA/RI VALVE OP FAILURE A FAILUR LEAKAGE	EN: MO E	S DE CO	SLOW BE ULD	LY OR ADDRES	LATI SED	ON T	IOA R HE FM	ECON EA/C	(DELA MENDS	YED THA	OPER T TH	ATIC IS I CRI	N, TEM	AND SUCH

ASSESSMEN ASSESSMEN NASA FMEA	T ID:	RCS-10	8 043X					SA DATA: BASELINE NEW]	7.4
SUBSYSTEM MDAC ID: ITEM: AXES		10043	ER B	IPROP	SOL	ENOID	VAI	- LVE, PRIM	IARY	, A	LL
LEAD ANAL	YST:	C.D. P	RUST								
ASSESSMEN											
c	RITICALI FLIGHT	[TY	RE	DUNDA	NCY	SCREE	NS		CIL		
	HDW/FU	VC	A		В		С			••	
NASA IOA	[1/1]	[]	[]	[[]	[x]	*
COMPARE	[N /N]	[]	[]	[]	[N]	
RECOMMEND	ATIONS:	(If	diff	erent	fro	m NAS	A)				
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* CIL RET	ENTION I	RATIONA	LE:	(If a	ppli		3.5	DEQUATE DEQUATE]	
REMARKS: NASA/RI D VALVE OPE FAILURE M A FAILURE LEAKAGE O	NS SLOW! ODE BE A COULD !	LY OR L ADDRESS	ATE) ED O	. IO N THE	A RE	COMME A/CIL	NDS VIV	THAT THE	IS I CRI	TEM T.	AND SUCH

ASSESSMENT DATE: 1/01/88 ASSESSMENT ID: RCS-10116 NASA FMEA #: 03-2F-121									1		1		DATA: LINE [] NEW [X]
	SUBSYSTE MDAC ID:	M:	ē		FI 10 TI	RCS 0116 HRUS'	TER	BIPR	OP SO	LEN	IOID VI	LV, F	RIMARY, ALL AXES
	LEAD ANA	ГĀ	ST	:	C.	.D.	PRUS	T					
	ASSESSME	NT	:										
		CR		ICAL LIGH		ď	F	REDUN	DANCY	sc	REENS		CIL ITEM
							2		В		C	2	IIEM
	NASA IOA	[3 1	/3 /1]		[]	[]	[]	[x] *
	COMPARE	[N	/N]		[]	Ţ]	[]	[N]
	RECOMMEN	'DA'	TI	ons:		(If	dif	fere	nt fro	тс	NASA)		
		[1	/1]		[]	[]	[]	[A] (ADD/DELETE)
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	IOA RECO	MM N D	DU. PL	RING ACED	GI Ol	ROUNI	D C/ E CI	O TR	ICKLE FIRINC	CU 3 O	RRENT F A TH	TEST IRUST	PREMATURE) BE UPGRADED TO ER ON THE GROUND PROP,
	THIS EPD	C	(R	JD)	FA]	LURI	E MA	Y BE	COVE	RED	IN TH	ie gn	C SUBSYSTEM.

1/01/88 RCS-1013 03-2A-22	8X 1310-3				BASEL	ATA: INE [] NEW [X]
ARCS 10138 THRUSTER	BIPRO	P SO	LENOI	D VA	LVE,	PRIMARY, ALL
C.D. PRU	ST					
	REDUND	ANCY	SCRE	ENS		CIL ITEM
	A	B		С		
] []	[]	[]	[x] *
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(If di	fferen	t fr	om NA	SA)		
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RATIONALE	: (If	appl	icabl	e) Al INA	DEQUA' DEQUA'	TE [] TE []
IISM MITC	TOTAL A	ND E	3 TT 11D	 E MOI	DE (D	DEMATITIE
GROUND C	/O TRI	CKLE	CURR	ENT !	rest)	BE UPGRADED TO
ON THE C	IL. F	IRIN	G OF	A TH	RUSTE	R ON THE GROUND
LOSS OF L	IFE DU	E TO	EXPÔ	SURE	TO P	ROP,
THRUSTER FAILURE M	AY BE	COVE	RED I	N TH	E GNC	SUBSYSTEM.
	RCS-1013 03-2A-22 ARCS 10138 THRUSTER C.D. PRU ITY ITY ITY ITY ITY ITY ITY IT	ARCS 10138 THRUSTER BIPRO C.D. PRUST ITY REDUND NC A [RCS-10138X 03-2A-221310-3 ARCS 10138 THRUSTER BIPROP SO C.D. PRUST ITY REDUNDANCY FOR A B [RCS-10138X 03-2A-221310-3 ARCS 10138 THRUSTER BIPROP SOLENOI C.D. PRUST ITY REDUNDANCY SCRE C.D. A B [RCS-10138X 03-2A-221310-3 ARCS 10138 THRUSTER BIPROP SOLENOID VAN C.D. PRUST ITY REDUNDANCY SCREENS OR A B C OR B	RCS-10138X 03-2A-221310-3 ARCS 10138 THRUSTER BIPROP SOLENOID VALVE, 1 C.D. PRUST ITY REDUNDANCY SCREENS F NC A B C [

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-308 05-6KF-2176	-1	NASA DATA BASELINE NEW	[]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 308 CONTROLLER,	REMOTE POWER		
LEAD ANALYST:	D. HARTMAN	1715.55		error elestr
ASSESSMENT:				
CRITICAL FLIGH		UNDANCY SCREEN	1S	CIL ITEM
HDW/FU	NC A	В	С	
NASA [3 /1R IOA [2 /1R	[P] [P]	[P] [P]	P] P]	[X] *
COMPARE [N /] []	[]	. 1	[N]
RECOMMENDATIONS:	(If differ	rent from NASA	A)	
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* CIL RETENTION	RATIONALE: (ADEQUATE	[]
REMARKS:	NACA EMEA	J	INADEQUATE	L 1

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SUBSYST: MDAC ID ITEM:				FR 30 CO)L	LEI	R,	REM	OT	E	POW	ER						. * *		#12 ^{**}
LEAD AN	ALY	ST	:	D.	HA	RTI	MAI	N													
ASSESSM	ENT	:																			
	CR		ICAL: LIGH'		•		R	EDU	JNDA	NC:	Y	SCR	EEN	s				CI I'I	IL IEM	1	
		HD'	W/FU	NC			A]	В			С							
NASA IOA	[3 3	/1R /1R]		[P P]		[]	P P]	[P P]			[]	*
COMPARE	[/]		[]		[-]	[]			[]	
RECOMME	NDA	TI	ons:		(If	đ:	if:	fer	rent	f	ro	m N	ASA)							
	[/]		[]		[]	[]		(AI		DE		ETE)
* CIL RI	:			RAT	'ION	ALJ	Ε:	()	[f a	.pp	li	cab		AI NAI	DEQ DEQ	UAT] UAT]	E E	[]	
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-310	76 A-1		NASA DATA: BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 310 CONTROLLE	R, REMOTE	POWER		
LEAD ANALYST:	D. HARTMA	N			
ASSESSMENT:					
FLIGHT			SCREENS		CIL ITEM
HDW/FUI	NC A	В		С	
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COMPARE [/] [] [] []	[.]
RECOMMENDATIONS:	(If dif	ferent fro	om NASA)		
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NO DIFFERENCES.					· -

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-311	76 A- 2		NASA DAT BASELIN NI	ra: NE [] EW [X]
MDAC ID:	FRCS 311 CONTROLLE	R, REMOTE	POWER	,	
LEAD ANALYST:	D. HARTMAI	4			
ASSESSMENT:					
CRITICAL FLIGH	ITY RI	EDUNDANCY	SCREE	1S	CIL ITEM
HDW/FU	NC A	E	3	С	
NASA [3 /3 IOA [2 /1R] [] [P] [F]	P]	[] * [X]
COMPARE [N /N] [N] [N	[]	ו א]	[N]
RECOMMENDATIONS:	(If dif	ferent fr	om NASA	Y)	
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REMARKS: IOA AGREES WITH	NASA FMEA.				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		. ~	-1		NASA DAT BASELIN NE	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 312 CONTROI	LLER,	REMOTE	POWER		
LEAD ANALYST:	D. HART	MAN				
ASSESSMENT:						
CRITICAL FLIGH		RED	UNDANCY	SCREEN	IS	CIL ITEM
HDW/FU	NC	A	В		C	
NASA [3 /1R IOA [2 /1R] [P]	[P [P] [P] P]	[x] *
COMPARE [N /] []	[] [. 1	[N]
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IOA AGREES WITH	MADA IMI	LM.				

	ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-313	:			ASA DATA BASELINE NEW]	
	SUBSYSTEM: MDAC ID: ITEM:	FRCS 313 CONTROLL	ER, RE	MOTE	POWEF	ŧ.			
	LEAD ANALYST:	D. HARTM	AN						
	ASSESSMENT:								
	CRITICAL: FLIGH HDW/FU	r	REDUND A	ANCY B	SCREE	ens C		CIL	
	·			_			-	-	7 Æ
	NASA [3 /1R IOA [3 /1R] [P]	[P]	[P]	[] ~
-	COMPARE [/] []	[]	[]	[]
	RECOMMENDATIONS:	(If di	fferen	it fr	om NAS	SA)			
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	* CIL RETENTION DE REMARKS:	RATIONALE	: (If	appl:	icable	A)	DEQUATE DEQUATE]

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LEAD ANA	LYS	T	:	D.	. HA	R'I'	MA	N										
ASSESSME	ENT:	:																
	CRI		ICAL:		Č		R	EDUN	IDAN(CY	SC	REEN	S			CI:		
	H		W/FUI				A			В		-	С			11.	EPI	
NASA IOA]	3	/1R /1R]		[P P]	[[P P]	[P P]		[]	*
COMPARE	[/]	•	[]	[]	[]		[]	
RECOMMEN	IDAT	'I	ONS:		(If	đ:	if:	fere	ent :	fro	m	NASA)					
	. [/]		[]	[]	ĺ]	(A	[DD/I) DEL	ETE
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REMARKS:																	-	

NO DIFFERENCES.

ASSESSMENT DA ASSESSMENT II NASA FMEA #:		315	76 A -2				ASA DASEL	INE]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 315 CONTR	OLLEI	R, REN	MOTE	POWEI	₹	. 4			-
LEAD ANALYST:	D. HA	RTMAN	1							
ASSESSMENT:										
	CALITY LIGHT	RI	EDUNDA	ANCY	SCRE	ENS			CIL	,
		A		В		С			TIEF	1
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COMPARE [/]	[]	[]	[]		[]
RECOMMENDATIO	ONS: (If	difi	ferent	t fr	om NAS	SA)				
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* CIL RETENTI REMARKS: NO DIFFERENCE		ALE:	(If a	appl	icable	A	DEQUA' DEQUA'		[]

ASSESSMENT DATE: ASSESSMENT ID:	1/29/88 FRCS-316		NASA DATA: BASELINE [] -1 NEW [X]							
NASA FMEA #:	05-6KF-225	1 -1	NEW	[X]						
SUBSYSTEM: MDAC ID: ITEM:	FRCS 316 DIODE									
LEAD ANALYST:	D. HARTMAN									
ASSESSMENT:										
CRITICAL FLIGH		DUNDANCY SCREEN	S	CIL ITEM						
HDW/FU		В	С	1121						
NASA [3 /1R IOA [3 /1R] [P]] [NA] [] [P] [P] F]	[] * [x]						
COMPARE [/] [N]] [N] [и]	[N]						
RECOMMENDATIONS:	(If diffe	erent from NASA	.)	Δ.						
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* CIL RETENTION	RATIONALE:		ADEQUATE NADEQUATE	[]						
REMARKS: IOA AGREES WITH	NASA FMEA.									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-317	51 - 2		BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 317 DIODE			-	
LEAD ANALYST:	D. HARTMA	N			
ASSESSMENT:					
CRITICAL FLIGH		EDUNDANCY	SCREENS		CIL ITEM
HDW/FU	-1-1	В	C	# 4 · •	
NASA [3 /3 IOA [3 /1R] [F] [P] [] [F]	[x] *
COMPARE [/N] [N] · [N] [N]	[N]
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REMARKS:				DEQUATE	į
IOA AGREES WITH	NASA FMEA.				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-318 05-6KF-2251 -1	NASA DATA: BASELINE [] NEW [X]
MDAC ID:	FRCS 318 DIODE	
LEAD ANALYST:	D. HARTMAN	
ASSESSMENT:		
CRITICAL FLIGH HDW/FU	T	NS CIL ITEM C
NASA [3 /1R		[P]
IOA [3 /1R	[P] [NA] [F] [P]	[P] []* [F] [X]
COMPARE [/] [N] [N]	[и] [и]
RECOMMENDATIONS:	(If different from NAS	A)
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* CIL RETENTION REMARKS:) ADEQUATE [] INADEQUATE []

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SUBSYSTE MDAC ID: ITEM:	M:		FRO 319 DIO	9									g÷-c						*
LEAD ANA	LYST	':	D.	HAF	(T	(A)	1												
ASSESSME	NT:																		
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		'LIGH' W/FU				A				В			C				1 141	.1	
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COMPARE	[/N]		[N]		[]	N)	ſ	N]		[N]	
RECOMMEN	DATI	ons:		(If	di	Ĺfí	fere	ent	f	rc	m N	ASA)						
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ASSESSME ASSESSME			NASA DATA: BASELINE []									
NASA FME	A #:	05-6	KF-22	52 -	1			NEW	<i>[</i>	X]	
SUBSYSTE MDAC ID: ITEM:	M:	FRCS 320 DIOD										
LEAD ANA	LYST:	D. H	ARTMA	N								
ASSESSME	NT:											
		ALITY GHT	R	EDUN	DANCY	SCR	EENS			IL PEN	χ.	
		FUNC	A		В		Ċ		1.	LEP	1	
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RECOMMEN	DATION	ıs: (I	f dif	fere	nt fro	om N.	ASA)					
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* CIL RE			NALE:	(If	appl	icab						
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REMARKS: IOA AGRE	ES WIT	'H NASA	FMEA.									

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		NASA DATA: BASELINE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 321 DIODE	A HELD HELD STORY
LEAD ANALYST:	D. HARTMAN	
ASSESSMENT:		
CRITICAL: FLIGHT HDW/FUI	r	CIL ITEM
·		
NASA [3 /1R IOA [2 /1R] [P] [F]] [F] [P]	[P] [X] * [P] [X]
COMPARE [N /] [N] [N]	[] []
RECOMMENDATIONS:	(If different from NAS	A)
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* CIL RETENTION	RATIONALE: (If applicable	1)
	,	ADEQUATE [] INADEQUATE []
REMARKS: NASA FMEA CONTAIN HAS NO EFFECT.	NS MULTIPLE FAILURES. DI	ODE FAILING SHORT ALONE

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSMI ASSESSMI NASA FMI	ENT	I		FR	29/8 CS-3 -6KE	322		52 -	·1					ASA DA BASELI N		[x]	
SUBSYSTI MDAC ID: ITEM:				FROM 322															
LEAD AN	ALY	ST	:	D.	HAF	(T	IAN	1											
ASSESSMI	ENT	:																	
	CR:		ICAL				RI	EDUN	IDAN		SCF	REEN					IL PEM	1	
-]	HDI	W/FUI	NC			A			В			С						
NASA IOA	[[/1R /1R			[P P]] [P P]	[P P]		[[x]	*
COMPARE	[N	/]		[]	[]	[]		[N]	
RECOMMEN	VDA!	ΓI	ons:		(If	đ.	if	fere	nt	fr	om N	NASA)						
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* CIL RI	:		-					(If	ap	pl.	icak	•		DEQUAT DEQUAT]]	
IOA AGRI	EES	W.	ITH 1	NAS	A FM	ŒΖ	۸.												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-32: 05-6KF-		NASA DATA: BASELINE NEW		
SUBSYSTEM: MDAC ID: ITEM:	FRCS 323 DIODE				
LEAD ANALYST:	D. HARTI	MAN			
ASSESSMENT:					
CRITICAL: FLIGH		REDUNDA	NCY SCRE	ens	CIL ITEM
HDW/FU		A ,-	В	C	
NASA [3 /1R IOA [2 /1R] [P] F]	[F] [P]	[P] [P]	[X] * [X]
COMPARE [N /] [N]	[N]	[]	[]
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)	
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* CIL RETENTION	RATIONAL	E: (If a	applicable	e) ADEQUATE	r 1
			-	INADEQUATE	()
REMARKS: NASA FMEA CONTAI HAS NO EFFECT.	NS MULTI	PLE FAII	LURES. D	IODE FAILING	SHORT ALONE

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSMENT DAY ASSESSMENT ID NASA FMEA #:	FE: 1/29 FRCS 05-6	/88 -324 KF-2:	267 -	DATA LINE NEW	[] (]	-				
SUBSYSTEM: MDAC ID: ITEM:	FRCS 324 DIOD										
LEAD ANALYST:	D. H.	ARTM	AN								
ASSESSMENT:											
	CALITY	1	REDUN	DANCY	SCR	EENS			CII		
	FUNC	1	A	E	3	С			ITI	SM	
NASA [3 /	/3] /3]	[]	[]	[]]]	*
COMPARE [/	′]	[)	[]	[]		[)	
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* CIL RETENTIO	N RATIO	VALE:	(If	appl	icab				_		
							DEQUA DEQUA		[]	
REMARKS: THIS FAILURE M POSITION. REI TO FALSELY FAI OPERATIONS.	UNDANCY	PROV	VIDED.	. LO	ss o	F ALL	REDU	INDAI	1CY	MAY	LEAD

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSME ASSESSME NASA FME	NT I	ID:	1/29/ FRCS- 05-6K	325	67 -:	2		<u> </u>	IASA BASE	DATA: LINE NEW	[]	
SUBSYSTE MDAC ID: ITEM:	M:		FRCS 325 DIODE										
LEAD ANA	LYS	r:	D. HA	RTMA	N		,,						
ASSESSME	NT:				-								
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	_	FLIGH DW/FU		A		Е	3	C	2		111	il'I	
NASA IOA	[:	3 /3 3 /3]	[]	[[]	[]		[]	*
COMPARE	[/]	[]	[]	[3		[]	
RECOMMEN	DAT:	ions:	(If	dif	fere	nt fr	om N	ASA)			-		
	[/	1 .	[]	[]	[]	(A)	[DD/I] ELE	TE)
* CIL RE	TEN'	TION	RATION	ALE:	(If	appl	icab	7	ADEQU ADEQU		[]	
REMARKS: NO DIFFE		CES.									-	-	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	[[
MDAC ID:	FRCS 326 DIODE							
LEAD ANALYST:	D. HART	MAN						
ASSESSMENT:								
CRITICAL FLIGH	ITY T	REDUNDA	ANCY	SCRE	ens		CIL	
	NC	A	В		С			-
NASA [3 /3 IOA [3 /3] []	[]	[]	[] *
COMPARE [/] []	[]	[1	[]
RECOMMENDATIONS:	(If d	ifferent	t fro	om NAS	SA)			
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* CIL RETENTION		E: (If a	appli	cable) AI INAI	DEQUATE DEQUATE	[]
REMARKS: THIS FAILURE MAY POSITION. REDUN TO FALSELY FAILI OPERATIONS.	DANCY PR	OVIDED.	LOS	S OF	NDIC ALL	CATION OF REDUNDAN	THE	E VALVE MAY LEAD

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

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SUBSYSTEMDAC ID:				FR 32 DI	7						. •				
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ASSESSME	ENT:														
	CRI			LITY		R	EDUN	DANCY	SCR	EENS			CII		
	H		LIGH V/FU	-		A		F	3	c	:		ITI	2M	
NASA IOA	[3	/3 /3]		[]	[]	[]		[]	*
COMPARE	[/]		C]	[]	[]		[]	
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ASSESSME	ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-328 NASA FMEA #: 05-6KF-2202A-							-1								DA ELI N	NE	-]		
SUBSYSTE MDAC ID:				328		,	H?	/BR]	ID							•						
LEAD ANA	LYS	ST	:	D.	HAR	ΤM	Aì	1														
ASSESSME	NT	:																				
	CR		ICAL: LIGH:				RI	EDUI	1DA	ANC	Y	SCI	REE	NS	3				CI	L EM	1	
	1	HDV	/FUI	NC			A				В				С							
NASA IOA	[[3 3	/1R /1R]		[[P P]		[P P]]	P P]			[[]	*
COMPARE	[/]		[]		[]	•	[]			[]	
RECOMMEN	DA?	ric	ons:	((If	di	fi	fere	∍nt	: f	rc	om 1	NAS	À)								
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* CIL RE	TE	(TV	ION I	RATI	ONA	LE	:	(II	ľ a	pp	1 i	cak	ole)	Αľ	EOU	JAT:	E	ſ		1	
REMARKS:	DEN	JCI	7 0												IAI	EQU	JAT:	E	-		j	

ASSESSME ASSESSME NASA FME	ΝT	II		FR	CS-	329			-2							DA ELI N	NE				
SUBSYSTE MDAC ID:				FR 32 DR		₹,	н	/BRI	D					. 3							
LEAD ANA	LY	ST	:	D.	HAI	RTI	IAN	1													
ASSESSME	NT	:																			
	CR		ICAL: LIGH		7		RI	EDUN	IDA	NC	Y	SCRI	EENS	3					IL CEN	Æ.	
]	_	W/FU				A				В			С				-		•	
NASA IOA]	3 2	/3 /1R]		[P]		[P]	[P]			[x]	*
COMPARE	[N	/N]		[N]		[N	1	[N]			[N]	
RECOMMEN	IDA'	TI	ons:		(If	d :	if	fere	ent	. 1	rc	om N	ASA)							
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* CIL RE		NT:	ION :	RAT	NOI	AL	E:	(II	ŧа	pp) 1:	Lcab)				TAŪ TAU		[]	
KEMAKKS:		T.7	TITE .	NT A C	יא בי	MTT:	λ														

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	: 1/29/88 FRCS-330 05-6KF-2					ASA DATA BASELINE NEW	[x]	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 330 DRIVER,	HYBRID)							
LEAD ANALYST:	D. HARTM	IAN						.1 ***		
ASSESSMENT:										
CRITICA FLIG HDW/F	HT	REDUNE	ANCY	SCREE	NS C			IL FEN	1	
now/ r	ONC	A	В							
NASA [3 /1 IOA [2 /1	R] [R] [P] P]	[P [P]	[P [P]	[x] *	
COMPARE [N /] []	[]	[]	[N]	
RECOMMENDATIONS	: (If di	fferer	t fro	m NAS	A)					
, , , t /] []	[]	[] (A	•	/DI] ELET	E)
* CIL RETENTION REMARKS: IOA AGREES WITH		·	appli	cable.	Al	DEQUATE DEQUATE	[]	
TOW WREED MILL	HADA PALA	3 •								

ASSESSMEN ASSESSMEN NASA FMEA	T ID:	1/29/88 FRCS-33 05-6KF-	1	2 -2]	NASA I BASEI	LINE]
SUBSYSTEM MDAC ID: ITEM:	·:	FRCS 331 DRIVER,	HY	BRID							
LEAD ANAL	YST:	D. HART	MAN								
ASSESSMEN	T:									– .	
c	RITICAL FLIGHT HDW/FUI	r	REI	DUNDAN	В	SCREE		C		CIL	1
NASA	,			1 r	. D	1	r 1	- D 1	•	г	1 *
IOA	[3 /1R [3 /1R	į	P	j	P	j	[]	P]		[j
COMPARE	[/] [) []	[]		[]
RECOMMEND	ATIONS:	(If d	iff	erent	fro	om NAS	SA)				
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* CIL RET		RATIONAL	E:	(If ap	pli	cable	1	ADEQU <i>P</i> ADEQU <i>P</i>]

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-332	202 -1		NASA DATA BASELIN NE	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 332 DRIVER,	HYBRID			
LEAD ANALYST:	D. HARTM	IAN			
ASSESSMENT:					
CRITICAL FLIGH	ITY T	REDUNDA	NCY SCRI	EENS	CIL ITEM
HDW/FU	NC	A	В .	С	
NASA [3 /1R IOA [2 /1R] [P] P]	[P] [P]	[P] [P]	[] * [x]
COMPARE [N /] []	[]	[]	[N]
RECOMMENDATIONS:	(If di	.fferent	from N	ASA)	
[/] []	[]	[] (7	[] ADD/DELETE
* CIL RETENTION	RATIONALE	: (If a	npplicab	le) ADEQUATE INADEQUATE	
REMARKS: IOA AGREES WITH	NASA FMEA	١.			

ASSESSMEN ASSESSMEN NASA FMEA	T T	D •	1/29/8 FRCS-3 05-6KI	122	20	2 -2			-	NASA DAT BASELIN NE	E]	
SUBSYSTEM MDAC ID: ITEM:	1:		FRCS 333 DRIVER	R, 1	нұ	BRID			-	±		_5			
LEAD ANAI	LYSI	?:	D. HAI	RTM	AN			i i							-
ASSESSMEN	T:		•												
(ICAL]	RE	DUNDA	ANCY	SCREE	:NS	3		CI	L EM	Į.	
	HE	W/FUI	NC		A		В			C =					
NASA IOA	[3	/1R]	[P P]]	[P [P]	[P] P]		[[]	*
COMPARE	[/]	[]	[]	[]		[]	
RECOMMENI	CTAC	ons:	(If	di	ff	erent	fro	om NAS	A)						
	[/]	[]	[]	[] (ΑD	[D/	'DE] :LE	TE
* CIL RE	rent	I NOI	RATION	ALE	:	(If a	appl	icable		ADEQUATE]	
REMARKS:	DFN(ידכ							ŦL	IADEQUATE	ı	L		J	

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	NASA DATA BASELINE NEW				
SUBSYSTEM: MDAC ID: ITEM:	FRCS 334 DRIVER,	HYBRID			
LEAD ANALYST:	D. HART	MAN			
ASSESSMENT:					
CRITICA FLIG	CIL ITEM				
	JNC	A	IIEM		
NASA [3 /3 IOA [3 /3] [] []	[].	[] *
COMPARE [/] [] []	[]	[]
RECOMMENDATIONS	(If d	ifferent	from NAS	A)	
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* CIL RETENTION	RATIONAL	E: (If ap	-) ADEQUATE INADEQUATE	[]
REMARKS: THIS FAILURE MA POSITION. REDU TO FALSELY FAIL OPERATIONS.	NDANCY PR	OVIDED.	CURATE I	NDICATION O ALL REDUNDA	F THE VALVE NCY MAY LEAD

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-335	201A-2			TA: TNE [] TEW [X]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 335 DRIVER, H	HYBRID			
LEAD ANALYST:	D. HARTMA	AN			
ASSESSMENT:					
CRITICAL FLIGH HDW/FU	T	REDUNDANC	Y SCRE	ENS C	CIL ITEM
·		P 1 []	Ρl	r P 1	[]*
NASA [3 /1R IOA [3 /1R	jį	jį	F j	[Pj	[
COMPARE [/] [] [N]	[]	[N]
RECOMMENDATIONS:	(If dif	fferent f	rom NA	SA)	
[/	1] []	[]	[] (ADD/DELETE)
* CIL RETENTION	RATIONALE:	: (If app	licabl	e) ADEQUAT INADEQUAT	'E []
REMARKS: IOA AGREES WITH	NASA FMEA.	•	4		

ASSESSME ASSESSME NASA FME	NT DAT NT ID: A #:	E: 1/29 FRCS 05-6	9/88 NASA DATA: 5-336 BASELINE [] 6KF-2201 -1 NEW [X]									
SUBSYSTE MDAC ID: ITEM:	17.7 4	336	ER, HY									
LEAD ANA	LYST:	D. H	ARTMAN					· · · · · · ·				
ASSESSME	NT:											
		ALITY	REI	OUNDANC	Y SCF	REENS		CIL				
		GHT FUNC	A		В	c	2	ITEM				
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RECOMMEN	DATION	s: (I	f diffe	erent f	rom N	(ASA)						
	[3 /	2R]	[P]] [:	P]	[F)	[] (ADD/DELETE)				
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POSITION	LURE M . RED LY FAI	UNDANCY	PROVII	DED. LA	oss o	F ALI	REDU	N OF THE VALVINDANCY MAY LE	AD			
ISSUE NO	ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.											
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-337 05-6KF-22	01 -2		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 337 DRIVER, H	YBRID			and the state of t
LEAD ANALYST:	D. HARTMA	N			
ASSESSMENT:					
CRITICAL FLIGH		EDUNDA	ANCY SCREI	ens	CIL ITEM
HDW/FU			В	C	
NASA [3 /1R IOA [3 /1R] [P] [F]	[P] [F]	[P] [P]	[X] *
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[/] [3	[]	[] (A)	[] DD/DELETE)
* CIL RETENTION	RATIONALE:	(If a	applicable	≥) ADEQUATE	[]
REMARKS:	NACA EMEA			INADEQUATE	

ASSESSME ASSESSME NASA FME	s-3	338		02 A-	1			-			DATA LINE NEW]					
SUBSYSTE MDAC ID: ITEM:	ITEM: DRIVER, HYBRID								D									
LEAD ANA	LYS	T:	:	D. 1	HAI	?TI	IAN	1										
ASSESSMENT:																		
		REDUNDANCY S					SCREENS					CIL						
	FLIGHT HDW/FUNC									В	В							
NASA IOA			/1R /1R]] [P]				[P P]]	P P]		[]	*
COMPARE	[/]		[]	[,]	[]		[]	
RECOMMEN	DAI	'IC	ons:	(Ιf	d :	if	fere	nt	fr	om 1	NASA	.)			•		
[/]]	(•]	[]	(A	[DD/D	ELI	ETE)
* CIL RE	ONZ	ΑL	Ε:	(If	aŗ	pl	ical	-	A.		ATE ATE	() [[]					
REMARKS: NO DIFFERENCES.																		

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-339 NASA FMEA #: 05-6KF-2202A- SUBSYSTEM: FRCS MDAC ID: 339 ITEM: DRIVER, HYBRI										. 1	NASA BASE	LINE		3	•
LEAD ANA	LYS	T:		D.	HA	RTM	AN								
ASSESSMENT:															
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				INC		2	A]	В	(2		***	31/1	
NASA IOA	[3 /	/3 /3]	ه در	[]	[]	[]		נ נ] *	t
COMPARE	[,	/	1		[]	[1	[]		[]	
RECOMMEN	DAT	'IOI	NS:	;	(If	dii	ffere	ent fi	rom N	IASA)	•				
	[,	/	.]		[]	[]	[]	(A	[DD/I] DELET	Œ)
* CIL RE				RAT	TION.	ALE:	: (If	app:	licab	ž	() ADEQU ADEQU		[]	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-340	01 -1		NASA DATA BASELINE NEW	
	FRCS 340 FUSE, 1A				
LEAD ANALYST:	D. HARTMAN	4			
ASSESSMENT:					
CRITICALI FLIGHT		EDUNDANCY	SCREENS	5	CIL ITEM
HDW/FU		В		C	TIEM
NASA [3 /1R IOA [3 /1R] [P] [F] [P] [P] F]	[
COMPARE [/] [N] [] .[N]	[N]
RECOMMENDATIONS:	(If diff	ferent fro	om NASA)	1	
[/] [] [] [] (Al	[] OD/DELETE)
* CIL RETENTION I	RATIONALE:	(If appl	·	ADEQUATE NADEQUATE	[]
REMARKS: TOA AGREES WITH N	NASA FMEA.				

ASSESSME ASSESSME NASA FME	NT I	D:	FRCS-	·1		1	– – . – –	DATA ELINE NEW	[
SUBSYSTEMDAC ID:			FRCS 341 FUSE,	1 A					**			-1	
LEAD ANA	LYST	:	D. HA	RTMA	N								
ASSESSME	NT:												
	F	LIGH'	r			IDANCY					CII ITE		
	HD	W/FUI	NC	A	•	В		(C				
NASA IOA	[3 [3	/1R /1R]	[P]	[P [P]	[P] P]		[]	*
COMPARE	[/	1	[]	. []	[1		[]	
RECOMMEN	DATI	ons:	(If	dif	fere	ent fro	om NA	ASA)					
	[/]	[]	[]	[]	(A		ELE	ETE)
* CIL RE	TENT	ON I	RATION	ALE:	(If	appl	icab]		ADEQU ADEQU	JATE JATE	[]	
REMARKS: NO DIFFE	RENC	ES.						514 5					

ASSESSME ASSESSME NASA FME	NT I	D:		-342	76 -	1		1	IASA D BASEL	INE]		
SUBSYSTE MDAC ID:			FRCS 342 RESIS	STOR,	K 1/4	W								
LEAD ANA	LYST		D. H2	ARTMA	N									
ASSESSMENT:														
												CIL ITEM		
		W/FU		A		В	В.		2			••		
NASA IOA	[3	/3]	[[[]	[]	-	[]	*		
COMPARE	[/]	[]	[]	[]		[3		
RECOMMEN	DATI	ONS:	(11	f dif	fere	nt fr	om Na	ASA)						
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REMARKS:	(ADD/DELETE) * CIL RETENTION RAT ONALE: (If applicable) ADEQUATE [] INADEQUATE [] REMARKS: NO DIFFERENCES.													

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-343 05-6KF-20				ASA DATA BASELINE NEW								
SUBSYSTEM: MDAC ID:							,						
LEAD ANALYST:	D. HARTM	AN											
ASSESSMENT:													
FLIG	LITY I IT INC I		SCREI	ens C		CIL							
NASA [3 /3 IOA [3 /3] []	[]	[. []	[] *					
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RECOMMENDATIONS	(If di	fferen	t fr	om NAS	5A) -								
[/] []	[]	[] (A	DD/D] ELETE					
* CIL RETEITION	RATIONALE	: (If	app1:	icable	Δ1	DEQUATE DEQUATE	[]					
A SHORT ACROSS A	INADEQUATE [] REMARKS: A SHORT ACROSS A RLR TYPE RESISTOR IS NOT A CREDIBLE FAILURE. IOA RECOMMENDS REMOVAL OF THE "SHORT" FAILURE MODE FROM THIS FMEA.												
ISSUE RESOLVED A				YSTEM	MAN	AGER ON	1/20	/88					

ASSESSMENT ASSESSMENT NASA FMEA	ID:	FRCS-344	76 -1			NASA DAT BASELIN NE					
SUBSYSTEM: MDAC ID: ITEM:		FRCS 344 RESISTOR,	5.1K	1/4	v						
LEAD ANALYS	ST:	D. HARTMA	N								
ASSESSMENT:											
CR]			ANCY	SCREE	ens	CII					
F	FLIGHT IDW/FUN			В		С	ITE	iM			
NASA [] AOI	3 /3 3 /3] []	[]		[] *]			
COMPARE [/] []	[1	[]	[]			
RECOMMENDAT	CIONS:	(If dif	feren	t fro	om NAS	SA)					
, L	//] []	[]	[] ([ADD/D] ELETE			
* CIL RETEN REMARKS: NO DIFFEREN		ATIONALE:	(If a	appli	cable	e) ADEQUATE INADEQUATE	-]			

ASSESSME ASSESSME NASA FME	ENT ENT	D: I:	ATI D:	FRC: 05-	9/88 S-345 6KF-20	-1		N.	ASA BASI	DATA: ELINE [] NEW [X]			
SUBSYSTE MDAC ID:				FRC: 345 RES:		5.1	LK 1/4	W					
LEAD ANA	LY	ST	:	D. 1	HARTMA	N							
ASSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM													
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A SHORT	REMARKS: A SHORT ACROSS A RLR TYPE RESISTOR IS NOT A CREDIBLE FAILURE. IOA RECOMMENDS REMOVAL OF THE "SHORT" FAILURE MODE FROM THIS												
ISSUE RI	ESO FAI	LV LU	ED RE	AT ME MODE	ETING TO BE	WITE REMO	H SUBS	YST	'EM MAN	AGE	R ON 1/20/88		

ASSESSME ASSESSME NASA FME	ENT	II		FRCS	9/88 5-346 5KF-201	·1				DATA ELINE NEW	[,]	
SUBSYSTE MDAC ID:				FRCS 346 RESI	S STOR,	5.1	.K 1/41	7					
LEAD ANA	ALYS	ST:	:	D. I	IARTMAI	4							
ASSESSMENT: CRITICALITY REDUNDANCY SCREENS CIL													
			CIL ITEM										
	1		JIGH V/FU	IT INC	A		В		c		. 111	7M	
NASA IOA	[3 3	/3 /3]	[[[]]]		[] *	
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RECOMMEN	NDA!	ric	ons:	: (3	f dif	fere	ent fro	om N	IASA)				
	[/]	[]	Ţ]	[]	(A)	[DD/1] DELETE
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ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-347 NASA FMEA #: 05-6KF-2076 -1											ASA D BASEL		[]		
SUBSYSTE MDAC ID:					FRCS 347 RESIST	ror,	5.11	K 1/41	7							
LEAD ANA	LY	ST	:		D. HAI	RTMA	N									
ASSESSME	ASSESSMENT:															
CRITICALITY REDUNDANCY SCREENS FLIGHT HDW/FUNC A B C													CIL ITEM			
		HD	W/:	FUN	IC	A		В		C						
NASA IOA	[[3 3	1	3 3]	[]	[[]	[[]		[]	*	
COMPARE	[/]	[1	[]	[]		[]		
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* CIL RI	जाक	יייא	TO	N E	ATTON	ALE:	(Tf	appl	ical	ble)						
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REMARKS: A SHORT IOA RECO FMEA.	AC															
ISSUE RI	ESO	LV	ED	ΓA	MEET	ING 1	WITH	SUBS	(ST	EM MANA	GER	ON 1	./20,	/88	3	

(SHORT FAILURE MODE TO BE REMOVED).

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-348 05-6KF-20	77 -1				ASA DATA BASELINE NEW	-]
	FRCS 348 RESISTOR,	5.1K	1/4W	1				
LEAD ANALYST:	D. HARTMAI	N						
ASSESSMENT:								
FLIGH'	ITY RI T NC A		NCY B	SCREE	ens C		CIL	
NASA [3 /3 IOA [3 /3] []	[]	[]	[] *
COMPARE [/] []	[]	[]	[]
RECOMMENDATIONS:	(If dif	ferent	fro	om NAS	SA)			
[3 /2R] [P]	[P]	[P] (Al	[DD/DI] ELETE)
* CIL RETENTION	RATIONALE:	(If a	ppli	.cable	À	DEQUATE DEQUATE]
REMARKS: THIS FAILURE MAY POSITION. REDUNT TO FALSELY FAILIT OPERATIONS.	DANCY PROV	IDED.	LOS	S OF	ALL	REDUNDA	NCY I	AY LEAD
ISSUE NOT RESOLV	ED AT THE	MEETIN(G WI	тн тн	ie su	JBSYSTEM	MAN	AGER ON

ASSESSMI NASA FMI	ent ent ea	II #:	ATE	FR: 1/.	29/88 CS-349 -6KF-2) 2077 -	-1		1		LINE	[x]	
SUBSYSTIMDAC ID:	EM:			FR:	CS 9		lK 1/4							
LEAD AN	ALY	ST	:	D.	HARTN	IAN								
ASSESSMI	ENT	:												
	CR		ICA LIG			REDUI	NDANCY	SCF	REENS			CI TT	L EM	
	1	_		UNC		A	В	1	(2				
NASA IOA	[3 3	/3 /3]	[]	[]	[]		[[]	*
COMPARE	[/)	[]	[]	[]		[]	
RECOMMEN	NDA'	TI	ONS	:	(If di	ffer	ent fr	om N	IASA)					
	[/)	[]	[]	[]	(Al) DELE	ETE)
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REMARKS: A SHORT IOA RECO FMEA.	AC	ROS ENI	ss DS	A RLI REMOV	R TYPE VAL OF	REST	ISTOR "SHOR	IS N	OT A	CRED RE MO	IBLE DE FI	FA ROM	I LUF THI	Æ. S
ISSUE RI 1/20/88										STEM	MAN	\GE	R ON	Ī

ASSESSME ASSESSME NASA FME				77 -1				ASA DATA BASELINE NEW]
SUBSYSTE MDAC ID:	M:	FRC 350	:s							
LEAD ANA	LYST:	D.	HARTMAN	1						
ASSESSME	NT:									
		CALITY	RI	EDUND	ANCY	SCRI	EENS		CIL	
		IGHT /FUNC	A		В		C	:	ITE	iM.
NASA IOA	[3 /	/3] /3]	[]]]	[]	[] *
COMPARE	[/	/]	[]	[]	[1	[]
RECOMMEN	DATIO	NS: (If diff	feren	t fr	om NA	ASA)			
	[3 ,	/2R]	[P]	[P]	[F	(A	[.DD/D] ELETE)
* CIL RE	TENTI	ON RATI	ONALE:	(If	appl:	icab]	À	DEQUATE]
REMARKS: THIS FAI POSITION								CATION O		

ISSUE NOT RESOLVED AT THE MEETING WITH THE SUBSYSTEM MANAGER ON 1/20/88.

TO FALSELY FAILING THE VALVE CLOSED, POSSIBLY EFFECTING MISSION

OPERATIONS.

NASA DATA:

ASSESSME ASSESSME NASA FME	NT NT A	D/ II :	ATI	E:	1/ FR 05	29/8 CS-3 -6KF	8 51 7-2	077 -	1		N		DATA: ELINE NEW	[x]	
SUBSYSTE MDAC ID: ITEM:					35		or	, 5.1	K 1/4	lW						
LEAD ANA	LYS	T	:		D.	HAF	(TM	AN								
ASSESSME	NT:	:														
		F	LI	GHT		•			DANCY I		REENS			CII	_	
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	[/]		C]	[]	[]	(AI	[DD/I] DELE	TE)
* CIL RE		T:	[0]	N R	LAT	'ION#	LE	: (If	app]	lica	. A		JATE JATE]	
REMARKS: A SHORT IOA RECO FMEA.	ACF	ROS ENI	SS	A RE	RI	R TY VAL	PE OF	RESI:	STOR "SHOP	IS :	NOT A FAILUF	CREI	DIBLE DDE FE	FAI ROM	LUR THI	E.
ISSUE RE 1/20/88												STE	MANA	AGEI	R ON	ſ

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-35: 05-6KF-	/29/88 NASA DATA: RCS-352 BASELINE [] 5-6KF-2077 -1 NEW [X]						
SODSISIEM.	FRCS 352 RESISTO							
LEAD ANALYST:	D. HARTI	MAN						
ASSESSMENT:								
CRITICAL: FLIGHT		REDUNDA	NCY SCI	REENS	CIL			
	NC	A	В	С	ITEM			
NASA [3 /3 IOA [3 /3] []	[]	[]	[] *			
COMPARE [/] []	[]	[]	[]			
RECOMMENDATIONS:	(If d	ifferent	from N	NASA)				
[3 /2R] [P]	[P]		[] (ADD/DELETE)			
* CIL RETENTION I	RATIONALI	E: (If a	pplicat					
				ADEQUATI INADEQUATI				
REMARKS: THIS FAILURE MAY POSITION. REDUNI TO FALSELY FAILIN OPERATIONS.	DANCY PRO	OVIDED.	LOSS C	F ALL REDUNI	DANCY MAY LEAD			

1/20/88.

ISSUE NOT RESOLVED AT THE MEETING WITH THE SUBSYSTEM MANAGER ON

ASSESSME ASSESSME NASA FME	NT	II):		FR			77 -	·1			nasa Base		[#14 #
SUBSYSTE MDAC ID: ITEM:					FR 35 RE	3	OR,	5.1	.K 1/4	W						
LEAD ANA	LY	ST	:		D.	HAF	(TMA	N			, e					٠
ASSESSME	NT	:														
	CR:			ALI GHT			R	EDUN	IDANCY	sc	REENS			CIL		
	1			FU			A		В			C				
NASA IOA	[3	/	3 3]		[]	[]	[]		[]	*
COMPARE	[/]		[]	[]	[]		[]	
RECOMMEN	IDA'	TI	NC	s:		(If	dif	fere	ent fr	om	NASA)					
	[/]		[]	[]	[]	(Al	[D/D		
* CIL RE		NT:	10	N I	RAT	'ION <i>I</i>	ALE:	(If	appl	ica		ADEQU ADEQU		[]	
REMARKS: A SHORT IOA RECO FMEA.	AC	RO: EN:	SS DS	A RI	RI EMC	R TY	PE OF	RESI THE	STOR "SHOR	IS T"	NOT A	CRED	IBLE DE FI	FAI ROM	LUI TH	Œ. IS
ISSUE RE	ESO	LV	ED) A'	r 1	HE N	ŒET	ING	WITH	THE	E SUBS	YSTEM	MAN	AGER	01	1

1/20/88 (SHORT FAILURE MODE TO BE REMOVED).

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-354 05-6KF-20	1/29/88 NASA DAT FRCS-354 BASELIN 05-6KF-2077 -1 NE					
SUBSYSTEM: MDAC ID: ITEM:	FRCS 354 RESISTOR,	5.1K 1/4	W				
LEAD ANALYST:	D. HARTMA	N	-				
ASSESSMENT:							
FLIGH	-				CIL ITEN	ſ	
HDW/FU	NC A	. В		С			
NASA [3 /3 IOA [3 /3] [] [] []	[] *	
COMPARE [/] [] [] []	[]	
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)				
[3 /2R	[P) [P] [[DD/DE] ELETE)	
* CIL RETENTION	RATIONALE:	(If appl	•	ADEQUATE IADEQUATE	[]	
REMARKS: THIS FAILURE MAY POSITION. REDUN TO FALSELY FAILI OPERATIONS.	DANCY PROV	IDED. LO	RATE INI	CATION O	F THE	VALVE	
ISSUE NOT RESOLV	ED AT THE	MEETING W	ITH THE	SUBSYSTEM	MANA	AGER ON	

ASSESSMENT ID: ASSESSMENT ID: NASA FMEA #:	FRCS-355 05-6KF-207	7 -1	BZ	ASELINE [NEW []	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 355 RESISTOR,	5.1K 1/4W			
LEAD ANALYST:	D. HARTMAN				
ASSESSMENT:					
FLIGH				CII IT	
HDW/FU	NC A	В	С		
NASA [3 /3 IOA [3 /3] [] [] [] [] [] *]
COMPARE [/] [:] [] []] []
RECOMMENDATIONS:	(If diffe	erent from	m NASA)		
[/] [:	1 (נ :	[(ADD/I] DELETE)
* CIL RETENTION	RATIONALE:	(If appli	ADI	EQUATE []
REMARKS: A SHORT ACROSS A IOA RECOMMENDS R FMEA.	RLR TYPE RIEMOVAL OF TH	ESISTOR ISHE "SHORT	S A NOT CI " FAILURE	REDIBLE FA	ILURE. THIS
ISSUE RESOLVED A 1/20/88 (SHORT F				PEM MANAGE	R ON

	ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-356 NASA FMEA #: 05-6KF-2078 -1								IASA DATA BASELINI NEV]
SUBSYSTE MDAC ID:				TOR,	1.2	(2W					
LEAD ANA	LYS	T:	D. HA	RTMA	N						
ASSESSME	NT:										
		TICAL FLIGH	ITY	R	EDUNI	ANCY	SCRE	ENS		CII	
			NC	A		В		c	:	***	11.1
NASA IOA	[3 /3 3 /3]	[]	[]	[]	[] *
COMPARE	ξ	/]	[]	[]	[]	[]
RECOMMEN	DAT	ions:	(If	dif:	feren	t fr	om NA	SA)			
ħ.	ו	3 /2R	1	[P]	[P	1	[F	·]] ELETE)
* CIL RE	TEN	TION	RATION	ALE:	(If	appl	icabl	À	DEQUATE	[]
REMARKS: THIS FAI POSITION TO FALSE OPERATIO	LY	REDUN	DANCY	PROV	IDED.	LO	SS OF	INDI ALI	CATION O	OF TH	IE VALVE MAY LEA

ISSUE NOT RESOLVED AT THE MEETING WITH THE SUBSYSTEM MANAGER ON 1/20/88.

ASSESSMI ASSESSMI NASA FMI	ENT	I	D:	FRO	S-35	57	078 - :	1		1	NASA DAT BASELIN NE			
SUBSYSTI MDAC ID: ITEM:				FRO 357 RES	7	DR	, 1.2	K 2W						
LEAD ANA	ALYS	ST	:	D.	HART	ľM	AN							
ASSESSMI	ENT:	:												
	CR		ICAL LIGH			1	REDUN	DANCY	SC	REENS		CIL		
	I		/FU			2	A	В		(2			
NASA IOA	[[3 3	/3 /3]	[]	[]	[[]	[]	*
COMPARE	[/]	[]	[]	(]	נ]	
RECOMMEN	NDAT	ric	ons:	((If d	li:	ffere	nt fro	om :	NASA)				
	[/]	(]	[]	[] ([ADD/D		ETE)
* CIL RI	ETEI	NT:	ION	RATI	ONAI	Œ	: (If	appl:	ica		ADEQUATE ADEQUATE]]	
REMARKS					ana wasan sa da			2 ⁷ 37	* *			• • • • • • • • • • • • • • • • • • •		
ISSUE RI											STEM MA	NAGER	Ol	1

ASSESSME ASSESSME NASA FME	NT ID:		-358		NASA D BASEL	
SUBSYSTE MDAC ID:	M:	FRCS 358 HE O	(& FU I	SOL VLV A	OR B SWITC	e H
LEAD ANA	LYST:					
ASSESSME	NT:					
		CALITY	REDU	NDANCY SO	REENS	CIL ITEM
		FUNC	A	В	С	TIM
NASA IOA	[3 /	/] /1R]	[_P]	[] [P]	[p]	[] *
COMPARE	[N /	/N]	[14]	[N]	[N]	[
RECOMMEN	DATION	NS: (I	f differ	ent from	NASA)	
	[/]	[]	[]	[]	[] (ADD/DELETE)
	***	ON RATIO	NALE: (1	f applica	ble) ADEQUA INADEQUA	
REMARKS: HELIUM O BY IOA.	XIDIZE				VE A & B SW X-11084X.	VITCH RE-ANALYZED

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	FRCS-359		NASA DATA: BASELINE NEW	[]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 359 HE OX & FU	ISOL VLV A OR	B SWITCH	
LEAD ANALYST:				
ASSESSMENT:				
CRITICA FLIG		DUNDANCY SCREEN	S	CIL ITEM
	INC A	В	C	
NASA [/ IOA [3 /1]] [P] [p] [p]	* [.]
COMPARE [N /N] [N] [N] [и ј -	[]
RECOMMENDATIONS	(If diff	erent from NASA)	
[/] [] [] [[] DD/DELETE)
* CIL RETENTION	RATIONALE:		ADEQUATE NADEQUATE	
REMARKS: HELIUM OXIDIZER BY IOA. SEE AS:		OLATION VALVE A FRCS 11080X-11		RE-ANALYZED

ASSESSMEN ASSESSMEN NASA FME	NT ID:	FRCS-	360					ASA DATA BASELINI NEV]
SUBSYSTEMDAC ID:	M:	FRCS 360 HE OX	& F	u isc	DL VL	V A C	OR B	SWITCH		
LEAD ANA	LYST:									
ASSESSME	NT:									
•	CRITICA FLIG		R	EDUNE	ANCY	SCRE	EENS		CII	
	HDW/F		A		В		С			.171
NASA IOA	[/ / 1] R]	[[P]	[[P]	[[P]	[] *
COMPARE	[N /N	1	[N]	[N]	[N]	[]
RECOMMEN	DATIONS	: (If	dif	feren	nt fr	om NA	ASA)			
	[/]	[]	[]	[] (2	[ADD/E] DELETE)
* CIL RE	TENTION	RATION	ALE:	(If	appl	icabl	A	DEQUATE DEQUATE	-]
									CH RE	-ANALYZED

ASSESSME ASSESSME NASA FME	NT I	D:	FRCS-	361	NASA DATA: 361 BASELINE [] NEW []								
SUBSYSTE MDAC ID: ITEM: 1, 2			FRCS 361 HE OX	& F	TU IS	OL VI	LV A	OR B	SWITCE	H OPEN	CONT	ACTS	
LEAD ANA	LYSI	:											
ASSESSME	NT:												
		'ICAL		F	EDUN	DANCY	SCR	EENS		CI	L EM		
		W/FU		A	а в с					**	 -		
NASA IOA	[3	/3]	[]]]	[[]]] *]		
COMPARE	[]	и\ 1]	[]	[]	[]	[]		
RECOMMEN	DATI	ons:	(If	dif	fere	nt fi	om N	ASA)					
	[/	1	[3	[]	[]	[(ADD/] DELET	E)	
* CIL RE	TENT	'ION	RATION	ALE:	(If	app]	licab	1	ADEQUAT]		
REMARKS: HELIUM O	זחדצ	ZER	AND FIT	EI. I	'SÖT.A'	TTON	VATA	Έλ	R SWI	гтсн в	E-ANA	LVZED	
BY IOA.			ESSMEN								- 1111A		

ASSESSME ASSESSME NASA FME	NT I	D:	FRCS-	362				N	IASA DAT BASELIN NE]
SUBSYSTE MDAC ID: ITEM: 1, 2	M:		FRCS 362 HE OX	& F	U IS	OL VI	V A	OR B	SWITCH	OPEN	CONTACTS
LEAD ANA	LYS	r:									
ASSESSME	NT:										
ı		rical Fligh		R	EDUN	DANCY	SCR			CII	
	HI	OW/FU	NC	A		В	1	C	2		
NASA IOA	[:	3 /3]	[]	[[]]]	[] *
COMPARE	[]	N / N]	C]	[]	[1	[]
RECOMMEN	DAT:	cons:	(If	dif	fere	nt fr	om N	'ASA)			
	[/]	[]	ι]	ľ.] ([ADD/I] DELETE)
* CIL RE	TENT	TION	RATION	ALE:	(If	appl	icab	P	DEQUATE]
REMARKS: HELIUM O			AND FU ESSMEN							CH RE	E-ANALYZEI

ASSESSME NASA FME	NT	II			3-363				1	NASA DATA BASELIN NE]	
SUBSYSTE MDAC ID: ITEM: 3, 4				FRCS 363 HE C		TU IS	OL V	LV A	OR B	SWITCH (GPC (CONTACT	rs
LEAD ANA	LYS	T:	3										
ASSESSME	NT:	:											
	CRI			LITY	F	REDUN	DANC	Y SCR	EENS		CII		
	H		IGI V/F		Į	1	1	В	(C	ITI	rm.	
NASA IOA	[3	/ /3]	[]	[]	[]	[[] *] •	
COMPARE	[N	/N]	[]	[]	[]	[]	
RECOMMEN	DAT	'IC)NS	: (1	fdif	fere	nt fi	com N	ASA)				
	[/]	[]	[]	[] (2	[ADD/I] ELETE)	
* CIL RE	TEN	T	ON	RATIC	NALE:	(If	app]	licab	1	ADEQUATE ADEQUATE	[]	
REMARKS: HELIUM O				AND F							CH RE	E-ANALY	ZEI

ASSESSME ASSESSME NASA FME	NT]	[D:	FRCS-	RCS-364 NASA DATA: BASELINE [] NEW []								
SUBSYSTE MDAC ID: ITEM: 3, 4			FRCS 364 HE OX	(& F	U IS	OL VI	LV A	OR B	SWITCH G	PC (CONTACTS	
LEAD ANA	LYST	r:										
ASSESSME	NT:											
		TICAL FLIGH		R	EDUN	DANCY	SCR	EENS		CII		
		W/FU		A	A B C					* 4 MF1		
NASA IOA	[3	3 /3]]]	[]	[]	[] *	
COMPARE	[]	1 /N]	[]	[]	[]	[1	
RECOMMEN	DAT]	ons:	(If	dif	fere	nt fr	om N	ASA)				
	[/]	[]	[]	[] (A	[DD/I] DELETE)	
* CIL RE	TENI	MOI	RATION	ALE:	(If	appl	icab.		ADEQUATE ADEQUATE	[]	
			AND FU							H RE	E-ANALYZED	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-36	5						SA DATA ASELINE NEW	[]	
SUBSYSTEM: MDAC ID: ITEM: 5, 6	FRCS 365 HE OX &	FU	ISOL 7	VLV	AC	R E	3 5	WITCH C	LOS	S E	CON	ITACTS
LEAD ANALYST:												
ASSESSMENT:										./**		
CRITICAL		REI	DUNDAN	CY	SCRE	EENS	3		C)	[L [EN	r	
FLIGH HDW/FC	-	A		В			С	÷		L	1	
NASA [/ IOA [3 /1F] [P] [F]	[P]	[x] *	ŧ
COMPARE [N /N] [N) [N]	[N	J	[N]	
RECOMMENDATIONS:	(If d	iff	erent :	fro	om NA	SA)						
[/] [,] []	[] (A	DD,	/DI] ELET	ΓE)
* CIL RETENTION	RATIONAL	E:	(If ap	pl i	cabl			EQUATE EQUATE	[]	
REMARKS: HELIUM OXIDIZER BY IOA. SEE ASS	AND FUEL	IS IDs	OLATIO FRCS	N (ALVE	E A -110	&)84	B SWITC	н 1	RE-	-ANZ	ALYZEI

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-366		BASELINE NEW	[]
SUBSYSTEM: MDAC ID: ITEM: 5, 6	FRCS 366 HE OX & F	U ISOL VLV A OR	B SWITCH C	LOSE CONTACTS
LEAD ANALYST:				
ASSESSMENT:				
CRITICAL: FLIGHT	r	REDUNDANCY SCREE		CIL ITEM
HDW/FU	NC A	В	С	
NASA [/ IOA [3 /1R] [] [P	[P]	[] [P]	[-] *
COMPARE [N /N] [N	[и] [и	[N]	[]
RECOMMENDATIONS:	(If dif	ferent from NAS	A)	
[/] [] []	[] (AI	[] DD/DELETE)
* CIL RETENTION 1	RATIONALE:	•	ADEQUATE	[]
REMARKS: HELIUM OXIDIZER A BY IOA. SEE ASSI			A & B SWITCH	. ,

ASSESSMENT D. ASSESSMENT I NASA FMEA #:		FRCS-3	367					ASA DATA BASELINI NEV	Ξ []	
SUBSYSTEM: MDAC ID: ITEM: 7, 8		FRCS 367 HE OX	& 1	FU IS	OL VL	/ A	OR B	SWITCH (PEN	CONTAC	TS
LEAD ANALYST	:										
ASSESSMENT:									1 146	v e e e	
	ICAL: LIGH: W/FUI	r		REDUNI	DANCY B	SCR	EENS C		CII		
NASA [IOA [3	/ /1R]	[]	P]	[[F]	[[P]	[}] *	
COMPARE [N	/N]	[]	4]	[N]	[N	1	[]	1]	
RECOMMENDATI	ons:	(If	di	ffere	nt fro	om N	ASA)				
[/	1	[1	[]	[] (2	[ADD/I] DELETE)	
* CIL RETENT REMARKS:	ION 1	RATIONA	ALE:	: (If	appl:	icab	A	DEQUATE DEQUATE	•]	
HELIUM OXIDI									CH RE	E-ANALY	ZEI

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-368			NASA DATA: BASELINE NEW	[]
MDAC ID:	FRCS 368 HE OX & F	FU ISOL	VLV A OR	B SWITCH O	PEN CONTACTS
LEAD ANALYST:					
ASSESSMENT:					
CRITICAL FLIGH	T		CY SCREE	ns C	CIL ITEM
HDW/FU	NC F	A	В	C	
NASA [/ IOA [3 /1R] [[] [P] [P]	[] [P]	[] *
COMPARE [N /N] []	v] [и ј	[N]	[]
RECOMMENDATIONS:	(If dif	fferent	from NAS	A)	
[/] [] []	[] (AI	[] DD/DELETE)
* CIL RETENTION	DATTONATE.	· /Tf an	nlicable	`	
	RATIONALL.	. (II ap	-	ADEQUATE INADEQUATE	[]
REMARKS: HELIUM OXIDIZER	AMD EITET T	የፍለተ አጥተላ	M 172 T 175	A C B COTMO	I DELANATVER
	ESSMENT II				i Ke-maniael

ASSESSMI ASSESSMI NASA FMI	ENT	II		FRCS-	-369				1	NASA D BASEL		•]	
SUBSYSTIMDAC ID ITEM: 9, 10				FRCS 369 HE OX	⟨ & F	U IS	or vi	LV A	OR B	SWITC	H GP	c co	ONTACTS	
LEAD AN	ALYS	T:	:											
ASSESSM	ENT:													
	CRI		ICAL LIGH	ITY T	R	EDUN	DANC	SCR	EENS			CIL ITEN		
	F	IDV	/FU	NC	A		F	3	(3				
NASA IOA		3	/ /3]	[]	[]	[]		[[] *]	
COMPARE	(N	/N	1	[]	[]	[]		[]	
RECOMME	radn	ľ	ons:	(I :	dif	fere	nt fi	com N	ASA)					
	[1	3	C]	[]	[]	(AD)	[D/DI] ELETE)	
* CIL R		T:	ION	RATIO	VALE:	(If	appl	licab	1	ADEQUA ADEQUA	TE	<u> </u>]	
REMARKS HELIUM BY IOA.	OXII	OI:	ZER ASS	AND FU	JEL I	SOLA S FR	TION CS 1	VALV X0801	E A 8	B SW	ITCH	RE	-ANALYZE	D

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-370	NASA DATA: BASELINE [] NEW []
MDAC ID:	FRCS 370 HE OX & FU ISOL VLV	A OR B SWITCH GPC CONTACTS
LEAD ANALYST:		-
ASSESSMENT:		
CRITICAL FLIGH HDW/FU	TT .	SCREENS CIL ITEM
1154710		
NASA [/ IOA [3 /1R] [] [] :] [F] [F]] [] [] *] [P] [X]
COMPARE [N /N		[и] [и]
RECOMMENDATIONS:	(If different from	m NASA)
ι /	1 [1 [] [] [] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If applied	cable) ADEQUATE [] INADEQUATE []
	AND FUEL ISOLATION VA	ALVE A & B SWITCH RE-ANALYZE 80X-11084X.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-371	NASA DATA BASELINE NEW	[]
SUBSYSTEM: MDAC ID: ITEM: 11, 12	FRCS 371 HE OX & FU ISOL	VLV A OR B SWITCH C	LOSE CONTACTS
LEAD ANALYST:			
ASSESSMENT:			
_ CRITICAL FLIGH		CY SCREENS	CIL ITEM
HDW/FU	NC A	B C	
NASA [/ IOA [3 /1R] [p] [F] [P]	[] * [X]:
COMPARE [N /N] [N] [и] [и]	[N]
RECOMMENDATIONS:	(If different	from NASA)	
[/] [] [[] DD/DELETE)
	RATIONALE: (If app	plicable) ADEQUATE INADEQUATE	•
	AND FUEL ISOLATION	N VALVE A & B SWITCE 11080X-11084X.	H RE-ANALYZED

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-372			ASA DATA: BASELINE NEW	•]
MDAC ID:	FRCS 372 HE OX & FU	J ISOL VL	JA OR B	SWITCH CL	OSE	CONTACTS
LEAD ANALYST:						
ASSESSMENT:	19			er .		
CRITICAL FLIGH HDW/FU	T	EDUNDANCY B	SCREENS C		CIL ITEM	
NASA [/ IOA [3 /1R] [;] [F] [] [F] [P]	[[x] *]
COMPARE [N /N] [N] [N] [N	1	[И]
RECOMMENDATIONS:	(If diff	ferent fro	om NASA)			
(/	J [] [] [] (AD	[D/DE] LETE)
* CIL RETENTION	RATIONALE:	(If appl:	A	DEQUATE DEQUATE	[]
REMARKS: HELIUM OXIDIZER BY TO A SEE ASS					RE-	ANALYZED

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		-1	NASA DATA BASELINE NEW											
SUBSYSTEM: MDAC ID: ITEM:	FRCS 373 HE TK PRESS-2	PRESS SEN	eree SOR											
LEAD ANALYST:	D. HARTMAN													
ASSESSMENT:														
CRITICALITY REDUNDANCY SCREENS CIL ITEM														
HDW/FU		B	C											
NASA [3 /2R IOA [3 /3	[P]] []	[P] []	[P] []	[] *										
COMPARE [/N] [и]	[и]	[N]	[]										
RECOMMENDATIONS:	(If differen	nt from NA	SA)											
[/] []	[]	[] (2	[] ADD/DELETE)										
* CIL RETENTION	RATIONALE: (If	applicabl	e) ADEQUATE INADEQUATE											
REMARKS: IOA AGREES WITH	NASA FMEA.			.										

ASSESSME ASSESSME NASA FME	ENT I	D:	FR		374	4	350	-1	•				I		A DATA SELINI NEV]	
SUBSYSTE MDAC ID:			FROM 374	4	PI	RE:	5S-	·2 P	RI	ESS	s s	ENSC)R						
LEAD ANA	LYST	:	D.	HAF	RTI	IAN	Ŋ												
ASSESSME	ent:																		
		LIGH	T					NDA	N		sc	REEN		•		CI IT	L EM		
	HD	W/FU	NC			A				В			(C					
NASA IOA	[3 [3	/2R /3]		[P]]	P]		:] :	P]		[[) *]	
COMPARE	[/N)		[N]		[N]	1	: 1	1]		[]]	
RECOMMEN	IDATI	ons:		(If	d:	if:	fer	ent	: 1	fro	om.	nas <i>i</i>	۲)						
	.	/)		[]		[]	I]	(2	[ADD/	DE		E)
* CIL RE		7					(I	if a	p	pl:	ica			ADE(ADE(QUATE	[:]	
IOA AGRE	CES W	ITH	NAS	A FN	ÆΖ	Α.													

ASSESSME ASSESSME NASA FME	NT I	D:	1/29/ FRCS- 03-2F	375	3350	-1				DATA: LINE NEW	[]	
SUBSYSTE MDAC ID: ITEM:	M:		FRCS 375 HE FU	TK	PRES	SS-1 P	RESS	SENS			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		-6. ,
LEAD ANA	LYSI	!:	D. HA	RTM	AN								
ASSESSME	NT:												
	F	'ICAL 'LIGH' W/FU			REDUN A	idancy B		EENS C			CII		
		•									_	_	_
NASA IOA	[3	/2R /3]	[P]	[P []	[P]		[]	*
COMPARE	[/N]	[N]	[N]	[N	3	-	[]	
RECOMMEN	DATI	ons:	(If	di	ffere	ent fr	om N	(ASA)					
	[/]	[]	[]	[]	(AI	[DD/I] DELE	TE)
* CIL RE REMARKS: IOA AGRE					·	appl	icab	A		JATE JATE	[]	
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SUBSYSTEM: MDAC ID: ITEM:	FRCS 378 HE OX TK PRESS-1	PRESS SENSOR	
LEAD ANALYST:	D. HARTMAN		
ASSESSMENT:			
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LEAD ANALYST:	D. HARTM	AN				
ASSESSMENT:						
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SUBSYSTEM: MDAC ID:	FRCS 387			R B SWITCH T	ALKBACK
LEAD ANALYST:	D. HART	MAN			
ASSESSMENT:					
CRITICAL: FLIGH		REDUNDA	NCY SCREE		CIL ITEM
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NASA [3 /3 IOA [3 /1R] [p]	[] [P]		[] *
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REMARKS: THIS FAILURE MAY POSITION. REDUNT TO FALSELY FAILU OPERATIONS.	DANCY PRO	OVIDED.	LOSS OF	INDICATION O	F THE VALVE NCY MAY LEAI

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

NASA FMEA #:		53 -1			LINE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 388 DIODE			· -	• • • • • • • • • • • • • • • • • • • •
LEAD ANALYST:	D. HARTMA	N			
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				ADEQU.	
REMARKS: NASA FMEA CONTA EFFECT.	NS MULTIPI	E FAILU	RES. TH	IIS FAIL	URE ALONE HAS NO

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	NT	ID:	1/29/ FRCS- 05-6K	389	53 - :	2			NASA DAT BASELIN NE]. ·
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SUBSYSTEM: MDAC ID: ITEM:	FRCS 398 DIODE				
LEAD ANALYST:	D. HAF	RTMAN			
ASSESSMENT:					
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REMARKS: LOSE GPC AVAILABL PROPELLA	E.	1	LOSS	OF	AL	L	REI	INUC	IAC				ANUA CAU								

ISSUE NOT RESOLVED AT THE 1/20/88 MEETING WITH THE SUBSYSTEM MANAGER.

ASSESSME ASSESSME NASA FME	NT I		FRC	9/88 5-40 6KF-		53B-	2				NASA I BASEI		[x]	
SUBSYSTE MDAC ID:	M:		FRC: 401 DIO													
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-402	53 A- 1		NASA DATA BASELINE NEW]
MDAC ID:	FRCS 402 DIODE					
LEAD ANALYST:	D. HARTMA	N				
ASSESSMENT:						
	ITY R	EDUNDAN	CY SCRE	ENS	CIL	
FLIGH HDW/FU	_		В	C	ITE	1.
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RECOMMENDATIONS:	(If dif	ferent	from NA	SA)		
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* CIL RETENTION REMARKS: LOSE CAPABILITY AVAILABLE. LOSS THRUSTER LEAK.	TO CLOSE V	ALVE WI	TH GPC.	ADEQUATE INADEQUATE MANUAL COM	j Mand:]] ING STILI A

SUBSYSTEM MANAGER STATED THAT THE GPC IS NOT USED TO ISOLATE A THRUSTER LEAK BECAUSE TIME TO TAKE EFFECT CAN BE UP TO 24 HOURS. SOFTWARE HAS TO BE MANUALLY LOADED. IOA WITHDRAWS THEIR ISSUE BASED ON THIS RATIONALE.

ASSESSME ASSESSME NASA FME	NT	ΙĎ		FI	/29/8 RCS-4 5-6KI	10		53 A -	-2						-	DATA: LINE NEW	[K]	
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IOA AGRE	ES	WI	TH I	ZAI	A FN	Œ	Α.													

ASSESSME ASSESSME NASA FME	NT NT A #	DA ID :	TE:	1/ FR 05	29/8 CS-4 -6KI	38 104 F-22	253 A -	1			NASA DATA BASELINE NEW]	
SUBSYSTE MDAC ID:				FR 40 DI										
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ASSESSME	NT:													
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THRUSTER	LE E HA	ak S	BE TO	CAU BE	SE '	rimi UAL	E TO	TAKE	EFFI	ECT C	r used to An be up Thdraws t	TO 2	24 H	OURS.

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SUBSYST MDAC ID ITEM:				FRC 405 DIO										
LEAD AN	ALY	ST	:	D. 1	HARTMA	N.								
ASSESSM	ENT	:												
	CR		ICAI LIGH	LITY	F	REDUN	NDANC'S	SCR	EENS			CII		
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-406 05-6KF-2	5 2253 - 1		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 406 DIODE				
LEAD ANALYST:	D. HARTI	MAN			
ASSESSMENT:					
CRITICAL FLIGH	T	REDUNDANC			CIL
HDW/FU	NC	A	В	С	
NASA [2 /1R IOA [3 /3] [P] [F] [P]	[X] *
COMPARE [N /N] [N] [N] [N J	[א]
RECOMMENDATIONS:	(If di	ifferent 1	from NASA	7)	
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* CIL RETENTION	RATIONALI	E: (If app		ADEQUATE	
REMARKS: NASA FMEA CONTAI EFFECT.	ns multi	PLE FAILUI	RES. THI	S FAILURE	ALONE HAS NO
AT MEETING WITH DISCUSSED. IT W	IAS AGREE	D UPON THA	AT THE IS	SUE RAISED	ABOVE WAS

ISSUE REMAINS OPEN.

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ASSESSMI	ENT:														
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-408												
SUBSYSTEM: MDAC ID: ITEM:	FRCS 408 DIODE					- -							
LEAD ANALYST:													
ASSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM													
HDW/FU		A	В	c	TIEM								
NASA [3 /1R IOA [3 /3] [P] [P] [P]	[]	*							
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* CIL RETENTION	RATIONALE	E: (If app	•	ADEQUATE NADEQUATE	[]								
REMARKS: NASA FMEA CONSID EFFECT.	ALONE	HAS NO											
AT MEETING WITH DISCUSSED. IT W DUE TO DIFFERENT	2206 WA ABOVE REFORE	WAS											

ISSUE REMAINS OPEN.

	1/29/88 FRCS-409 05-6KF-22	53E-2				ASA DATA BASELINE NEW		
MDAC ID:	FRCS 409 DIODE							
LEAD ANALYST:	D. HARTMA	N						
ASSESSMENT:								
CRITICAL		EDUND	ANCY	SCREE	ens		CII	
FLIGH HDW/FU	INC A		В		C		111	in.
NASA [3 /3 IOA [3 /3] []	[]	[]] [] *]
COMPARE [/] [] .	[]	[]	[]
RECOMMENDATIONS:	(If dif	feren	t fro	om NAS	SA)			
[/] [1	[]	[] (2] DELETE)
* CIL RETENTION REMARKS: NO DIFFERENCES.		(If		icable	A	DEQUATE DEQUATE]

ASSESSMENT DAT ASSESSMENT ID: NASA FMEA #:	E: 1/29/88 FRCS-41 05-6KF-	0 2253 - 1	NASA DATA BASELINE NEW		
SUBSYSTEM: MDAC ID: ITEM:	FRCS 410 DIODE				
LEAD ANALYST:	D. HART	MAN			
ASSESSMENT:					
	ALITY GHT	REDUNDÂN	Y SCREEN	'S	CIL ITEM
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NASA [2 / IOA [3 /	1R] [3] [P] [F] [P]	[X] *
COMPARE [N /	и] [и] [и] [n j	[N]
RECOMMENDATION	s: (If d	ifferent :	rom NASA		
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* CIL RETENTIO	N RATIONAL	E: (If ap)	•	ADEQUATE	[]
REMARKS: NASA FMEA CONT EFFECT.	AINS MULTI	PLE FAILU			
AT MEETING WIT DISCUSSED. IT DUE TO DIFFERE	WAS AGREE	D UPON THE	THE IS	SUE RAISED	ABOVE WAS

ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-411	53 -2	NASA DATA: BASELINE [] NEW [X]					
MDAC ID:	FRCS 411 DIODE							
LEAD ANALYST:	D. HARTMA	N						
ASSESSMENT:								
CRITICAL: FLIGH		EDUNDANCY	SCREEN	S	CIL			
HDW/FU	_	В		С	ITE	M		
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RECOMMENDATIONS:	(If dif:	ferent fro	om NASA)				
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* CIL RETENTION I	RATIONALE:	(If appli	icable)	ADEQUATE	г	1		
REMARKS: NO DIFFERENCES.			11	NADEQUATE]		

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ASSESSME ASSESSME NASA FME	NT	ID:	FRCS	9/88 5-412 6KF-22	253F-	·1	NASA DATA: BASELINE [] NEW [X]						
SUBSYSTE MDAC ID:			FRCS 412 DIOI	-									
LEAD ANA	LYS	T:	D. I										
ASSESSME	NT:												
		TICAI FLIGH		F	REDUN	DANCY	SCR	EENS			CII		
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* CIL RE	ETEN	TION	RATIO	ONALE:	: (If	app	licab	7	ADEQUA ADEQUA		[]	
REMARKS:													

NO DIFFERENCES.

ASSESSME	D:	1/29/88 FRCS-413 05-6KF-2253F-2							NASA DATA: BASELINE [] NEW [X]									
SUBSYSTE MDAC ID: ITEM:				41	RCS L3 CODE													
LEAD ANA	LY	ST	:	D.	. HAF	T	(A)	1									17.1	-
ASSESSME	NT	:																
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	1		LIGH W/FU				A				В			С			IT	LM
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RECOMMEN	IDA!	ric	ons:		(If	đi	Ĺfí	fere	ent	f	ro	om :	nasa))				
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IOA AGRE		W	ITH	NAS	SA FM	Œ₽	١.									1.1		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-414 05-6KF-22	53D-1			NASA DATA BASELINE NEV		
SUBSYSTEM: MDAC ID: ITEM:	FRCS 414 DIODE				-		
LEAD ANALYST:	D. HARTMA	N					
ASSESSMENT:							
CRITICAL FLIGH		EDUND	ANCY	SCREE	INS	CIL ITEM	
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COMPARE [/N) [N]	[14]	[N]	[]	l
RECOMMENDATIONS:	(If dif	feren	t fro	om NAS	SÁ)		Fund
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* CIL RETENTION		(If	appli	cable	a) ADEQUATE INADEQUATE	[]	
REMARKS:	NACA EMEX						

ASSESSME ASSESSME NASA FME	NT	ID:	1/29 FRCS 05-6	-415	253D-	·2	NASA DATA: BASELINE [] NEW [X]					
SUBSYSTE MDAC ID:			FRCS 415 DIOD	E								
LEAD ANA	LYS	T:	D. H	ARTM	AN							
ASSESSME	NT:											
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		FLIGH DW/FU		1	A	В		(ITEM		
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NO DIFFE	REN	CES.								•	-	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-416	53D-1		NASA DATA BASELINE NEV			
MDAC ID:	FRCS 416 DIODE						
LEAD ANALYST:	D. HARTMA	N					
ASSESSMENT:							
CRITICAL FLIGH	ITY R	EDUNDA	ANCY SCRE	ENS	CIL ITEM		
HDW/FU			В	C			
NASA [3 /1R IOA [3 /3] [P]	[P] []	[P] []	[] *		
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RECOMMENDATIONS:	(If dif	ferent	t from NA	SA)			
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* CIL RETENTION REMARKS: IOA AGREES WITH		(If a	applicabl	e) ADEQUATE INADEQUATE			

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SUBSYSTE MDAC ID:			FRCS 417 DIODE									
LEAD ANA	LYS:	r:	D. HA	RTMA	N							
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REMARKS	•							T145	TOTACUTI	- L	J	

NO DIFFERENCES.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-418 05-6KF-2253E-1	NASA DATA: BASELINE NEW	
	FRCS 418 DIODE		
LEAD ANALYST:	D. HARTMAN	-	·
ASSESSMENT:			
FLIGHT	REDUNDANCY REDUNDANCY R R R R R R R R R R R R R R R R R R R	SCREENS C	CIL ITEM
NASA [3 /1R IOA [3 /3] [P] [P] []] [P]] []	[] * []
COMPAŘE (/N] [N] [N] [N]	[]
RECOMMENDATIONS:	(If different fro	om NASA)	
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* CIL RETENTION I	RATIONALE: (If appli	.cable) ADEQUATE INADEQUATE	
REMARKS: NASA FMEA CONSIDI EFFECT.	ERS MULTIPLE FAILURE	S. THIS FAILURE	ALONE HAS NO
DISCUSSED. IT WA	SUBSYSTEM MANAGER ON AS AGREED UPON THAT INTERPRETATIONS OF EN.	THE ISSUE RAISED	ABOVE WAS

ASSESSME ASSESSME NASA FME	NT A ‡	I		FRC	9/88 S-419 6KF-22	53E-	-2	NASA DATA: BASELINE [] NEW [X]						
SUBSYSTE	M:			FRC	5				-					
MDAC ID:				419										
ITEM:				DIO	DE									
LEAD ANALYST: D. HARTMAN														
ASSESSME	NT:	:												-
CRITICALITY REDUNDANCY SCREENS FLIGHT													CIL ITEM	
	I		W/FU		A		В			С				
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IOA	Ĭ	3	/3	j	[j	į	j	Ì	j		Č	j	
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REMARKS:	ואם	NC.	RS.						***			·	J	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-420 05-6KF-2253 -1	NASA DATA: BASELINE [] NEW [X]							
SUBSYSTEM: MDAC ID:	FRCS								
LEAD ANALYST:	D. HARTMAN	east of	1						
ASSESSMENT:									
CRITICAL FLIGH	ITY REDUND	ANCY SCREENS	CIL ITEM						
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COMPARE [N /N] [N]	[и]	[N]						
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	 .	INADEQU	JATE [] JATE []						
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AT MEETING WITH DISCUSSED. IT W DUE TO DIFFERENT ISSUE REMAINS OP	AS AGREED UPON T INTERPRETATIONS		AISED ABOVE WAS						

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SUBSYSTE MDAC ID: ITEM:	M:		FRCS 421 DIODE	:							
LEAD ANA	LYS	T:	D. HA	RTMA	N						
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REMARKS:		CFS								J	•

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-422 05-6KF-22	53 A- 1	NASA DATA: BASELINE [] NEW [X]							
	FRCS 422 DIODE									
LEAD ANALYST:	D. HARTMA	N								
ASSESSMENT:										
CRITICA: FLIG	LITY R	REDÛNDANCY	SCREE	ens	CIL ITEM					
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COMPARE [/] [] []	[]	[]					
RECOMMENDATIONS	: (If dif	ferent fr	om NAS	SA)						
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* CIL RETENTION	RATIONALE:	(If appl	icable							
				ADEQUATE INADEQUATE	[]					
REMARKS: LOSE CAPABILITY AVAILABLE. LOSE THRUSTER LEAK.										
SUBSYSTEM MANAG THRUSTER LEAK B SOFTWARE HAS TO	ECAUSE TIME	TO TAKE	EFFECT	CAN BE UP	TO 24 HOURS.					

BASED ON THIS RATIONALE.

ASSESSM NASA FM	ENT]	D:	FRCS-	423	253 A-	·2			BASELII NI]
SUBSYST			FRCS 423 DIODE								
LEAD AN	ALYSI	r:	D. HA	RTM	AN						
ASSESSM	ENT:										
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RECOMME	NDAT]	cons:	(If	di	ffere	nt fr	om N	IASA)			
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* CIL R		rion :	RATION.	ALE:	: (If	appl	icab	ΑI	EQUATI EQUATI] 2 []
IOA AGR	EES V	VITH :	NASA F	MEA.	•						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-424 05-6KF-2254 -1	NASA DATA: BASELINE [] NEW [X]												
MDAC ID:	FRCS 424 DIODE													
LEAD ANALYST:	D. HARTMAN	en la centra de la companya de la c La companya de la co												
ASSESSMENT:														
	CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C													
NASA [2 /1R IOA [3 /3		[P] [X]* [] []												
COMPARE [N /N] [N] [N]	[N] [N]												
RECOMMENDATIONS:	(If different from N	IASA)												
[3 /3] [] []	[] [D] (ADD/DELETE)												
* CIL RETENTION	RATIONALE: (If applicab	ole) ADEQUATE []												
	Section 1	INADEQUATE []												
REMARKS: NASA FMEA CONSID EFFECT.	ERS MULTIPLE FAILURES.	THIS FAILURE ALONE HAS NO												
DISCUSSED. IT W	INTERPRETATIONS OF NST	/20/88, NSTS 22206 WAS E ISSUE RAISED ABOVE WAS IS 22206. THEREFORE, THE												

ASSESSMENT ASSESSMENT NASA FMEA	ID:		25	4 -2			[[x				
SUBSYSTEM: MDAC ID: ITEM:		FRCS 425 DIODE									
LEAD ANALYS	ST:	D. HAR	TMAN	Ī							
ASSESSMENT	:										
CR:	ITICALI FLIGHT		RE	DUNDA	MCA	SCREE	ens			CIL	
	HDW/FU		A		В		C	2			
NASA [] AOI	3 /3 3 /3]	[]	[]		=		[] *
COMPARE [/]	[]	[]	[3		[]
RECOMMENDA:	TIONS:	(If	diff	erent	fro	om NAS	SA)				
[/]	[]	[3	[]	(AI	[)D/D] ELETE)
* CIL RETE	NTION I	RATIONA	LE:	(If a	appli	icable	2	ADEQUAT ADEQUAT		[]
REMARKS:	NCEC								_		ı

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-426 05-6KF-22	54C-1			N	: [[X	;]	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 426 DIODE							
LEAD ANALYST:	D. HARTMA	N						
ASSESSMENT:								
CRITICAL FLIGH		EDUND	ANCY	SCREI	ens		CII	*
HDW/FU					•••			
NASA [3 /1R IOA [3 /1R	[F)]	[P [P]	[P]] K]] *
COMPARE [/] [N	[]	[]	[1	[N	1]
RECOMMENDATIONS:	(If dif	feren	t fr	om NAS	5A)			
1 /] []	[]	[] (2	[DD/I] DELETE)
* CIL RETENTION REMARKS:	RATIONALE:	(If	appl	icable	A	DEQUATE	Ĭ	•
IOA AGREES WITH	NASA FMEA.							

ASSESSME	SSESSMENT DATE: 1/29/88 SSESSMENT ID: FRCS-427 ASA FMEA #: 05-6KF-2254C-2												DATA: LINE NEW	[]	
SUBSYSTE MDAC ID: ITEM:	M:		FRCS 427 DIODE								-				. 82.		
LEAD ANA	LYSI	·	D. HA	RTI	MAI	Y											
ASSESSME	NT:																
·		'ICAL 'LIGH'	ITY F		RI	EDUNI	DAN	ICY	SCR	REENS	5				CL CEN	1	
		W/FU			A			В			С					-	
NASA IOA	[3	3 /3 3 /1R]	[[F]]	[P]	[[P]		[x]	*
COMPARE	נ	/N]	[N	J	[N]	[N]		[N]	
RECOMMEN	DATI	ons:	(If	d:	if	fere	nt	fr	om N	(ASA)	į						
	[/]	[]	[]	[]	(AI		/DI		ETE)
* CIL RE	TENT	ION I	RATION	λLI	Ξ:	(If	ap	pl:	icab	•	AD IAD	EQUA EQUA	TE TE	[]	
REMARKS:	ES W	ITH I	NASA F	ME	Α.												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-428 05-6KF-22	254C-1		: [x]	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 428 DIODE				
LEAD ANALYST:	D. HARTMA	AN			
ASSESSMENT:					
CRITICAL: FLIGH		REDUNDA	NCY SCREE	ens	CIL ITEM
HDW/FUI		A	В	С	1101
NASA [3 /1R IOA [3 /1R] []	P] F]	[P] [P]	[P] [P]	[x] *
COMPARE [/] [1	1]	[]	[]	[N]
RECOMMENDATIONS:	(If di	fferent	from NAS	SA)	
[/] []	[]	[] (A	[DD/DELETE)
* CIL RETENTION DEMARKS:	RATIONALE	: (If a	ipplicable	e) ADEQUATE INADEQUATE	[]

IOA AGREES WITH NASA FMEA.

SUBSYSTEM: FRCS MDAC ID: 429 ITEM: DIODE LEAD ANALYST: D. HARTMAN ASSESSMENT: CRITICALITY REDUNDANCY SCREENS CIL FLIGHT HDW/FUNC A B C	
ASSESSMENT: CRITICALITY REDUNDANCY SCREENS CIL FLIGHT	
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITE	
FLIGHT	
	•
NASA [3/3] [] [] [] [IOA [3/1R] [F] [P] [P] [X] *
COMPARE [/N] [N] [N] [N]
RECOMMENDATIONS: (If different from NASA)	
[/] [] [] (ADD/D	
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [INADEQUATE []
REMARKS: IOA AGREES WITH NASA FMEA.	

ASSESSME ASSESSME NASA FME	ENT I	D:	FRC	9/88 5-430 5KF-22	1	NASA DATA: BASELINE [] NEW [X]										
SUBSYSTE MDAC ID:			FRCS 430 DIO						11.5					1		
LEAD ANA	LYST	!:	D. 1	IARTMA	M									-		
ASSESSME	ENT:															
		ICAI	ITY	F	REDUN	DANCY	SCR	EENS			C]	IL PEM	ſ			
	_	W/FU		P	\	В	В		2		+ 1	LEN	L			
NASA IOA	[3	/3]	[]	[]	[]		[]	*		
COMPARE	[/]	[]	[]	[]		[]			
RECOMMEN	IDATI	ons:	(:	If dif	fere	nt fr	om N	ASA)		- н						
s La La Single	<u>.</u> [/	3	[]	[]	ξ]	(A l	[/QC	/DF] :LF	ETE ;		
* CIL RI	:	1 - 1	RATI	ONALE:	: (If	appl	icab	1	ADEQU ADEQU	ATE ATE	[]			

ASSESSME ASSESSME NASA FME	NT	I		FR	CS-4	3		54F	-2	NASA DATA: BASELINE [NEW [X]		
SUBSYSTE MDAC ID: ITEM:	M:			FR 43 DI																	
LEAD ANA	LY:	ST	:	D.	HAF	(T	IAN	1													
ASSESSME	NT	:																			
	CR:		ICAL: LIGH				RI	EDUI	NDA	NC	Y	SCI	REEN!	3					IL Pen		
	1		W/FU				A				В			C				-	L	*	
NASA IOA	[3	/3 /1R]		[F]] [F]	[P]	-		[x]	*
COMPARE	[N	/N]		[N]		[N]	C	N]			[N]	
RECOMMEN	DA!	ri(ons:		(If	d :	if	fer	ent	f	ro	om i	NASA))							
	(/]		[]		[]	C]		(AI		/DI		ETE)
* CIL RE	TE	NT:	ION I	RAT	ION#	L	Ε:	(I:	f a	pp	11	cak		IA IAN	DEQ DEQ	UAT!	E E	[]	
REMARKS: IOA AGRE	ES	W:	ITH 1	NAS.	A FM	Œ	Α.										-				

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SUBSYST MDAC ID ITEM:				43	RCS 2 ODE														
LEAD AN	ALY:	ST	:	D.	ная	\TI	IAM	N											
ASSESSM	ENT:	:																	
		F	ICAL: LIGH N/FUI	r			RI A	EDUI	NADN	CY B		CREEN	is C				CIL ITE	1	
NASA IOA]	3	/1R /3]]	P]	[P]	(P]	-		[]	*
COMPARE	[/N]		[N]	(N]	[N]			[]	
RECOMME	NDA:	ΓΙ	ONS:		(If	d:	if	fere	ent	fr	om.	NASA	۲)						
	[/]		[]	נ]	(1	(J	A DI	[D/DI] ELF	ETE
* CIL R		NT:	ION 1	R A I	NON?	L	Ε:	(Ii	f ap	pl	ic	_	A	DEQU.			[]	

IOA AGREES WITH NASA FMEA.

ASSESSMEN ASSESSMEN NASA FME	NT :	ID:	FRO		3 22!	54D-	-2						DATA LINE NEW	[]	
SUBSYSTEM MDAC ID:	M:		FRO 433 DIC	3													
LEAD ANA	LYS'	T:	D.	HART	MAI	1				: =							
ASSESSME	NT:																
					R	EDUN	IDANC	CY	SCR	EENS	5				CL CEN	a.	
		FLIG DW/F	UNC		A			В			С			1.	LEI	1	
NASA IOA	[:	3 /3 3 /1] R]]	F]	[[P]	[[P]		[X]	*
COMPARE	Ţ	/N]	[N]	[N]	ſ	N]		[N]	
RECOMMEN	DAT:	IONS	:	(If d	if:	fere	ent i	fro	om N	IASA))						
	[/]	E]	[3	[)	(A	DD,	/DI] E L E	ETE)
* CIL RE	TEN'	TION	RAT	IONAL	E:	(I1	f app	,1 :	icab		IA IAN	DEQU	ATE ATE	[]	
REMARKS: IOA AGRE	ES '	WITH	NASZ	A FME	A.												

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-434 NASA FMEA #: 05-6KF-2254B-1 NASA FMEA #: 05-6KF-2254B-1 NASA FMEA #: 05-6KF-2254B-1	
SUBSYSTEM: FRCS MDAC ID: 434 ITEM: DIODE	
LEAD ANALYST: D. HARTMAN	
ASSESSMENT:	
CRITICALITY REDUNDANCY SCREENS CIL ITEM	
HDW/FUNC A B C	
NASA [3 /2R] [P] [P] [P] [] IOA [3 /1R] [F] [P] [P] []	*
COMPARE [/N] [N] [] []	
RECOMMENDATIONS: (If different from NASA)	
[3/1R] [P] [NA] [P] [] (ADD/DEL	
* CIL RETENTION RATIONALE: (If applicable)	
ADEQUATE [] INADEQUATE []	
REMARKS: LOSE GPC COMMAND TO OPEN THE VALVE. MANUAL COMMANDING STI AVAILABLE. LOSS OF ALL REDUNDANCY MAY CAUSE INABILITY TO PROPELLANTS TO MEET CG LIMITS.	
ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/	20/88.

ASSESSMEI ASSESSMEI NASA FME	NT I		1/29/FRCS-	435	:54B-	2			ASA DATA BASELINI NEV			
SUBSYSTEM MDAC ID:	M:		FRCS 435 DIODE									
LEAD ANA	LYST	:	D. HA	RTMA	W							
ASSESSMEI	NT:											
		ICAL		F	EDUN	DANCY	SCR	EENS		CII		
		LIGH W/FU		A		В		С		115	.PI	
NASA IOA	[3	/3 /1R]	[[F	,]	[[P]	[[P]]] K]	;] *	t
COMPARE	[/N]	[]	[]	[1]	[N]	[N	[]	
RECOMMEN	DATI	ons:	(If	dif	fere	nt fr	om N	ASA)				
	[/	1	[3	[3	[] (2	[ADD/E	ELET	ſE)
* CIL RE	PENT	ION I	RATION	ALE:	(If	appl	icab	Al	DEQUATE DEQUATE	-]	
REMARKS:	rc w	י אידי	NASA FI	MEA.				T.1484	, L. WOLLIE	·	J	

ASSESSME ASSESSME NASA FME		FR	29/8 CS-4 -6KI	130		54B-	-1						ASA I BASEI	LINE		x]				
SUBSYSTE MDAC ID:	M:			FR 43 DI																
LEAD ANA	LYS	5 T :	:	D.	HAI	?TI	IAN	1					=							
ASSESSME	NT	:																		
	CRITICALITY FLIGHT									N	CY	SCR	EENS	3			CI IT	L EM		
	HDW/FUNC										В			C						
NASA IOA]	3 3	/2R /1R]		[P F]		[P P]]	P P]		[]	*	
COMPARE	[/N]		[N]		[]	[J		[)		
RECOMMEN	DA:	ric	ons:		(If	đ	if	fer	ent	: :	fro	om N.	ASA)	,	•					
	_[3	/1R	3		[P]		[NZ	A]	[P	J	(A	[\DD/	DEL	ETI	Ξ)
* CIL RE	TE	T.	ION 1	RAT	ION	\L	Ε:	(I:	f a	ıpı	pl i	cab	le)		SEOIT.	. mz		,		
				-									I		DEQUA DEQUA		[]		
REMARKS: LOSE GPC AVAILABL PROPELLA	E.]	LOSS	OF	AL	L]	REI	DUN:	DAN									STI TO		PEL

ASSESSME ASSESSME	NT I	D:	FRC	5-43	7							ASA DATA BASELIN]]
NASA FME	:A #:		05-0	6KF-	225	54B-	-2					NE	E [X]	
SUBSYSTE MDAC ID: ITEM:			FRC: 437 DIO									uning cog		# 10,577 	
LEAD ANA	LYST	! :	D. 1	HARTI	IAN	1									
ASSESSME	ENT:														
		'ICAL			RI	EDUN	IDAN	icy	SC	REENS	3		CI	L	
		W/FUI			A			В			С		**	Lini	
NASA IOA	[3	/3 /1R]	- [F]	[P]]	P]]	x]	*
COMPARE	(/N]	C	N]	(N]	[N]	[N]	
RECOMMEN	DATI	ons:	(:	If d	ifi	fere	nt	fr	om 1	NASA))				
	[/]	[]	[•]	[DEI	ETE)
* CIL RE						(If	ap	pl	ica	-		EQUATE]	
IOA AGRE	ies W	TIH	ACAK	rme											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-438 05-6KF-22	54A-1		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID:					<u>-</u>
LEAD ANALYST:	D. HARTMA	N			
ASSESSMENT:					
CRITICAL FLIGH		EDUNDANCY			CIL ITEM
	NC A	В		C	1121
NASA [3 /3 IOA [3 /3] [] [] []	[] *
COMPARE [/] [] [] [3	[]
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)		
1 /] [] [] [] (A)	[DD/DELETE)
* CIL RETENTION	RATIONALE:	(If appl	icable)		
			IN	ADEQUATE IADEQUATE	
REMARKS: LOSE GPC COMMAND AVAILABLE. LOSS ISOLATE A LEAK.					
SUBSYSTEM MANAGE THRUSTER LEAK BE HAS TO BE MANUAL	CAUSE TIME	TO EFFEC	T IS UP	TO 24 HOU	RS (SOFTWARE

THIS RATIONALE.

ASSESSME	ASSESSMENT DATE: 1/29/ ASSESSMENT ID: FRCS- NASA FMEA #: 05-6K SUBSYSTEM: FRCS															DAT. ELIN NE			[]	-
SUBSYSTE MDAC ID: ITEM:	M:			43																
LEAD ANA	LYS	T:		D.	HAI	RTI	IAN	1												
ASSESSME	NT:																			
			CALI				RI	EDUN	VDA)	NC	Y	SCF	REENS	3				II TE		
							A				В			C						
NASA IOA	HDW/F NASA [3 /3 IOA [3 /1]	F]		[P]	[P]		[3	[]	*
COMPARE	[,	/N]		[N]		[N]	[N]		(N	1]	
RECOMMEN	DAT	'IOI	NS:		(If	đ:	if	fere	ent	f	ro	om N	VASA))						
	RECOMMENDATIONS: (I									[]	[]	(.] ADD	/[) EI	ETE)
* CIL RE					(If	f a	pp	11	cak		AI NAI	DEQI DEQI	JATE JATE	[]				
IOA AGRE	E5	MT.	TH I	KAS.	a i'i	1Ľ/	Α.													

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	: 1/29/8 FRCS-4 05-6KF	8 40 -2254A-:	1			ASA DATA BASELINE NEW		
SUBSYSTEM: MDAC ID: ITEM:	FRCS							
LEAD ANALYST:	D. HAR	TMAN						
ASSESSMENT:								
FLTG	LITY HT						CIL	M
HDW/F	UNC	A	В		С			
NASA [3 /3 IOA [3 /3]	[]	[]	[]	[] *
COMPARE [/]	[]	[]	[]	[]
RECOMMENDATIONS	: (If	differe	nt fro	om NA	SA)			
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* CIL RETENTION	RATIONA	LE: (If	appl	icabl				
22/12/2		·			AI INAI	DEQUATE DEQUATE	[[]
REMARKS: LOSE GPC COMMAN AVAILABLE. LOS ISOLATE A LEAK.								
SUBSYSTEM MANAGE THRUSTER LEAK ENDING HAS TO BE MANUAL THIS RATIONALE.	ECAUSE T	IME TO	EFFEC	r is t	UP TO	O 24 HOU	RS (SOFTWARE

ASSESSME ASSESSME NASA FME	ENT	I	D:	FRC		54A-	-2		N		DATA LINE NEW	[
SUBSYSTE MDAC ID:				FRC 441 DIO										
LEAD ANA	LY	ST	:	D.	HARTMAI	1				= :	ŝ			
ASSESSME	ENT	:												
	CR				RI	EDU	NDANCY	SCR	EENS			CII	-	
	1		LIGH W/FU	NC	A		В		C	:		ITI	5M	
NASA IOA	[3	/3 /3]	[]	[[]	[[]		[]	*
COMPARE	[/]	[]	[]	[]		[]	
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	[/]	[]	[]	[]	(A] DÉLE	TE)
* CIL RE				RATI	ONALE:	(11	f appl	icab	A		JATE JATE	[]	
NO DIFFE	SKE	NC.	ES.											

	1/29/88 FRCS-442 05-6KF-2254 -1	NASA DATA: BASELINE [] NEW [X]	
MDAC ID:	FRCS 442 DIODE		
LEAD ANALYST:	D. HARTMAN		
ASSESSMENT:			
CRITICALI FLIGHT		EENS CIL ITEM	
HDW/FUN		c	
NASA [2 /1R IOA [3 /3] [P] [F]	[P] [X]* [] []	
COMPARE [N /N] [N] [N]	[N] [N]	
RECOMMENDATIONS:	(If different from N	(ASA)	
[3 /3] [] []	[] [D] (ADD/DELETE)	
* CIL RETENTION F	RATIONALE: (If applicab	·	
REMARKS:		ADEQUATE [] INADEQUATE []	·
	ERS MULTIPLE FAILURES.	THIS FAILURE ALONE HAS N	10
DISCUSSED. IT WA	INTERPRETATIONS OF NST	20/88, NSTS 22206 WAS ISSUE RAISED ABOVE WAS IS 22206. THEREFORE, THE	

	1/29/88 FRCS-443 05-6KF-2	254 -2				ASA DATA BASELINI NEV]	
	FRCS 443 DIODE								
LEAD ANALYST:	D. HARTM	AN							
ASSESSMENT:									
CRITICAI FLIGH		REDUNDA	ANCY	SCREE	ns		CIL		
HDW/FU		A	В		С	10111 5 5 22()		M	
NASA [3 /3 IOA [3 /3] []]]	[]	[] *]	•
COMPARE [/] [1	[]	[]	[]	
RECOMMENDATIONS:	(If di	fferent	t fro	om NAS	A)				
[/] [.]	[]	[] (2	[\DD/D		E)
* CIL RETENTION	RATIONALE	: (If a	appli	cable	AI	EQUATE EQUATE]	
REMARKS: NO DIFFERENCES.						-	-	-	

ASSESSME ASSESSME NASA FME	ENT I	D:	FRC	S-444	54E-	-1		N	IASA DA' BASELII N		x]
SUBSYSTEMDAC ID:			FRC 444 DIO								,
LEAD ANA	ALYSI	: :	D. 3	HARTMA	N						
ASSESSMI	ENT:										
				R	EDUN	NDANCY	SCR	EENS		CI IT	
	_	FLIGH W/FU		A		В		C		1,11	CM
NASA IOA	[3	/3]	[]	[[]	[[]	[.] *]
COMPARE	[/]	[]	[]	[]	[]
RECOMMEN	NDAT1	ONS:	(If dif	fere	ent fro	om N	ASA)			
	[/	1	[]	[]	[]	[(ADD/] DELETE
* CIL RI	•		RATI	ONALE:	(II	f appl:	icab	7	ADEQUAT:]

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SUBSYSTE MDAC ID:				FR 44 DI											
LEAD ANA	LY	ST	:	D.	HAI	RTMA	N								
ASSESSME	ENT	:													
	CR		ICAI LIGH	LITY (T		R	EDUN	DANCY	SCRI	EENS			CII		
	1		W/FU			A		В		(С		111	M1	
NASA IOA	/3 /3]		[]	[[]	[]		[]	*		
COMPARE	ſ		/]		[]	[]	[1		[]	
RECOMMEN	IDA:	ΓI	ons:		(If	dif:	fere	nt fr	om N2	ASA)					
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* CIL RE	:			RAT	IONA	LE:	(If	appl	icab]	1	ADEQU ADEQU	ATE ATE	[]	
MO DILLE	انلاك		• تانا												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-446 05-6KF-2254 -	1	NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 446 DIODE			
LEAD ANALYST:	D. HARTMAN			
ASSESSMENT:				
CRITICAL FLIGH	CIL ITEM			
HDW/FU		В	С	IIEM
NASA [2 /1R IOA [3 /3] [P]] []	[F] []	[P] []	[X] * []
COMPARE [N /N] [N]	[и]	[N]	[N]
RECOMMENDATIONS:	(If differe	nt from NA	SA)	
[3 /3] []	[]		[D] DD/DELETE)
* CIL RETENTION	RATIONALE: (If	applicable	e) ADEQUATE INADEQUATE	
REMARKS: NASA FMEA CONSID EFFECT.	ERS MULTIPLE F	AILURES.		
AT MEETING WITH DISCUSSED. IT W	AS AGREED UPON	THAT THE	ISSUE RAISED	ABOVE WAS

ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	NT	ID:	1/29/ FRCS- 05-6K	447	54 - :	2		N	NASA DA BASELI N] K]	[]	
SUBSYSTE MDAC ID:			FRCS 447 DIODE									. =	
LEAD ANA	LYS	T:	D. HA	RTMA]	N								
ASSESSME	NT:												
	CRI	TICAL		R	EDUN	DANCY	SCR	EENS			CII	_	
	Н	FLIGH DW/FU		A		Ī	3	C	2		TIE	.P1	
NASA IOA	[3 /3 3 /3]	[]	[]	[]		[]	*
COMPARE	[/]	[]	[]	[]		[]	
RECOMMEN	DAT	'ions:	(If	dif	fere	nt fr	com N	ASA)					
	[/]	[]	C ,]	[]	(AE	[D/D] ELF	ETE)
* CIL RE			RATION	ALE:	(If	app]	licab	7	ADEQUAT ADEQUAT		[]	
NO DIFFE	KEN	LED.											

- 젊을 내용된 사람들 하는 것이 살려보다.

ASSESSMI ASSESSMI NASA FMI	ENT I	D:	FRCS)/88 5-448 5KF-22	254F-	1		1	NASA DA BASELI N	NE [] x]	
SUBSYSTI MDAC ID: ITEM:			FRCS 448 DIOI									
LEAD AND	LYST	' :	D. H	IARTMA	AN .							
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NO DIFFERENCES.

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SUBSYSTEM MDAC ID:				44																
LEAD ANA	LY:	ST	:	D.	HAI	P.	MAI	V											-	
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SUBSYSTE MDAC ID:			FRCS 450 DIOD	Ξ							
LEAD ANA	LYST	! :	D. H	ARTMA	N						
ASSESSME	NT:										
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SUBSYSTE MDAC ID: ITEM:			FRCS 451 DIOD					-				
LEAD ANA	LYS	r:	D. H	ARTMA	N							
ASSESSME	NT:											
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SUBSYSTEM MDAC ID:		FRCS 452 DIODE								· , ,
LEAD ANA	LYST:	D. HAI	RTMA	N						
ASSESSME	NT:									
(CRITICAI FLIGH		R	EDUND	ANCY	SCREE	ens		CII ITE	
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ASSESSME ASSESSME NASA FME	NT :	ID:	FRCS-	453	54D-2			1	NASA D BASEL	INE]
SUBSYSTE MDAC ID: ITEM:			FRCS 453 DIODE									
LEAD ANA	LYS	r:	D. HA	RTMAI	N							
ASSESSME	NT:											
		TICAL FLIGH	ITY	R	EDUND	ANCY	SCRE	ENS			CIL	
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SUBSYSTE MDAC ID:			FRCS 454 DIOD								
LEAD ANA	LYSI	?:	D. H	ARTMA	AN		. •			м.	**
ASSESSME	NT:										
		ICAL LIGH		F	REDUN	IDANCY	SCR	EENS		CII	
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NO DIEFE	DEMO	יססי									

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SUBSYSTE MDAC ID: ITEM:	M:			FRCS 455 DIODE										
LEAD ANA	LYS	T:		D. HA	RTMAN	1								
ASSESSME	NT:													
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REMARKS:		CE	s.											

ASSESSMENT DATE: 1 ASSESSMENT ID: F NASA FMEA #: 0	RCS-456 BASELINE	
MDAC ID: 4	FRCS 156 DIODE	
LEAD ANALYST: D). HARTMAN	
ASSESSMENT:		
CRITICALIT FLIGHT	Y REDUNDANCY SCREENS	CIL ITEM
HDW/FUNC	B C	. IIEM
NASA [2 /1R] IOA [3 /3]	[P] [F] [P] [] []	[X] *
COMPARE [N /N]	[и] [и] [и]	[N]
RECOMMENDATIONS:	(If different from NASA)	
[3 /3]	[] [] (A)	[D] ADD/DELETE)
* CIL RETENTION RA	ATIONALE: (If applicable) ADEQUATE INADEQUATE	
REMARKS: NASA FMEA CONSIDER EFFECT.	RS MULTIPLE FAILURES. THIS FAILURE	: ALONE HAS NO
DISCUSSED. IT WAS	JBSYSTEM MANAGER ON 1/20/88, NSTS 2 S AGREED UPON THAT THE ISSUE RAISED INTERPRETATIONS OF NSTS 22206. THE	ABOVE WAS

ASSESSME ASSESSME NASA FME	TI	ID:	1/29/ FRCS- 05-6F	457	2		1	NASA DA BASELI N			
SUBSYSTE MDAC ID:			FRCS 457 DIODE	1							
LEAD ANA	LYS	T:	D. HA	RTMA	N						
ASSESSME	NT:										
		TICAL FLIGH		R	EDUN	DANC	SCR	EENS		CII	
			NC	A	I	В С					
NASA IOA	[3 /3 3 /3]	[]]]]] *
COMPARE	[/]	[1	[]	[]	[]
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	Ţ	/]	[]	[, 1	[]	[(ADD/D] ELETE)
* CIL RE	TEN	TION	RATION	ALE:	(If	appl	licab	1	ADEQUAT	E [
REMARKS:		CES	D 15 11						ADEQUAT	E []

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SUBSYSTEM: MDAC ID:	FRCS											
LEAD ANALYST:	D. HARTMA	M										
ASSESSMENT:												
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C												
NASA [3 /3 IOA [3 /3						[] *					
COMPARE [/] [] []	[]		[]					
RECOMMENDATIONS:	(If dif	ferent f	rom N	ASA)								
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* CIL RETENTION	RATIONALE:	(If app	licab	le) ADE INADE	QUATE	[]					
REMARKS: LOSE GPC COMMAND AVAILABLE. LOSS ISOLATE A LEAK.	TO CLOSE OF ALL RE	THE VALV DUNDANCY	E. MAY	ANUAL C CAUSE T	COMMAND: THE INA	ING BILI	STILL TY TO					
SUBSYSTEM MANAGER STATED THAT THE GPC IS NOT USED TO ISOLATE A THRUSTER LEAK BECAUSE TIME TO EFFECT IS UP TO 24 HOURS (SOFTWARE HAS TO BE MANUALLY LOADED). IOA WITHDRAWS THEIR ISSUE BASED ON THIS RATIONALE.												

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ASSESSME											BĀS	ELINE	[]	
NASA FMI			05-6KI			54 -:	2					ELINE NEW	Г (X]	
SUBSYSTEMDAC ID:			FRCS 459 DIODE	*							<u>.</u>				
LEAD ANA	ALYST	:	D. HAI	RTI	(A)	1									
ASSESSMI	ENT:														
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			NC		A	2		В			C ,				
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COMPARE	[/N]	ι	N]	[N]	[ן א		[/	1	
RECOMMEN	NDATI	ons:	(If	d:	ifi	fere	nt	fr	om N	ASA))				
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* CIL RI	etent:	ION 1	RATION	ALI	Ε:	(If	ap	pl:	icab	le)	ADEC	UATE UATE	[]	
REMARKS	EES W					155 AT	. 12	دست د ت	د مقد د	1.1	'ADE'	ONIE		j	

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ASSESSME ASSESSME NASA FME	II	ATE:	1/29/ FRCS- 05-61	-160	06 -	·1	-	N	ASA BASE	LINE]		
SUBSYSTE MDAC ID: ITEM:				FRCS 460 DRIVE	ER, H	YBRI	.D							
LEAD ANA	LYS	T	:	D. H2	ARTMA	N.					-			
ASSESSME	NT:	:												
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM														
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NASA IOA			/3 /3		[]	[]]]		[]	*
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POSITION TO FALSE														

ASSESSMENT DA ASSESSMENT II NASA FMEA #:	FRCS-		:06 -2	2			ASA DATA BASELINE NEW]		
SUBSYSTEM: MDAC ID: ITEM:	FRCS 461 DRIVE	ER, H	IYBRII)							
LEAD ANALYST	D. HA	RTMA	N								
ASSESSMENT:											
	ICALITY LIGHT	F	EDUNI	DANCY	SCRE	ens		CIL			
	/FUNC	A	L	В		C					
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RECOMMENDATIO	ONS: (I1	dif	fere	nt fro	om NAS	SA)					
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* CIL RETENT	ION RATION	VALE:	(If	appl	icable	≘)	DEQUATE	r	7		
	· · · · · · · · · · · · · · · · · · ·					INA	DEQUATE	[j		
REMARKS: THIS FAILURE MAY CAUSE LOSS OF ACCURATE INDICATION OF THE VALVE POSITION. REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY MAY LEAD TO FALSELY FAILING THE VALVE CLOSED, POSSIBLY EFFECTING MISSION OPERATIONS.											

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	FRCS-46 05-6KF-	8 62 -2206 -1	-			ASA DATA BASELINE NEW		-
SUBSYSTEM: MDAC ID: ITEM:	FRCS 462 DRIVER,	, HYBRID)					
LEAD ANALYST:	D. HART	IMAN			-			
ASSESSMENT:								
CRITICA FLIG	LITY	REDUNE	ANCY	SCREE	ns		CIL	
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REMARKS: THIS FAILURE MA POSITION. REDU TO FALSELY FAII OPERATIONS.	NDANCY PR	ROVIDED.	LOS	SOF	ALL	REDUNDA	NCY 1	MAY LEAD

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SUBSYSTE MDAC ID: ITEM:				FRCS 463 DRIV	ER, 1	HYBRI	D							
LEAD ANA	LYS	T:	:	D. H.	ARTM	AN								
ASSESSME	NT:													
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REMARKS: THIS FAI POSITION TO FALSE OPERATION	LUI L. ELY	RI F	EDUN	DANCY	PRO	VIDE). L	oss c	F ALI	RED	UNDA	NCY	MAY	LEAD

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SUBSYSTEMDAC ID:	: M:			FRCS 464 DRIVE								k egetterte	g≢n⊌ .48 	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
LEAD ANA	LY	ST	:	D. HA	RTMA	N								
ASSESSME	ENT	:												
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NASA IOA	[3	/3 /3]	[]	[]	[]]] *	
COMPARE	[/	1	[]	[]	[]		[]	
RECOMMEN	IDA'	TI(ons:	(If	dif	ferer	nt fro	om NA	SA)					
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 REMARKS: THIS FAI POSITION TO FALSE OPERATION	LU L L	R F	EDUNI	DANCÝ I	PROV	IDED.	LOS	S OF	INDI ALL	CATIO REDU	N OF	TH CY	E VA May	LEAD
ISSUE NO)T]	RE	SOLV	ED AT 1	MEET	'ING W	ITH S	SUBSY	STEM	MANA	GER	ON	1/20	/88.

ASSESSME ASSESSME NASA FME		207	-2				ASA DATA BASELINE NEW]					
SUBSYSTE MDAC ID: ITEM:				FRCS 465 DRIVE	ER,	HYE	BRID							
LEAD ANA	LYS	ST	:	D. H2	ARTM	AN								
ASSESSME	NT:	:												
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM														
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POSITION TO FALSE														

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		07 -1		NASA DATA BASELINE NEW	•							
SUBSYSTEM: MDAC ID: ITEM:	FRCS 466 DRIVER, H	YBRID										
LEAD ANALYST:	D. HARTMA	N										
ASSESSMENT:												
CRITICALITY REDUNDANCY SCREENS CIL ITEM												
FLIGHT ITEM HDW/FUNC A B C												
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RECOMMENDATIONS	(If dif	ferent fr	om NASA)									
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* CIL RETENTION	* CIL RETENTION RATIONALE: (If applicable) ADEQUATE []											
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SUBSYSTE MDAC ID:	:M:		FRCS 467 DRIVE					-	-				
LEAD ANA	LYS'	T:	D. HA	RTMA	N								-
ASSESSME	ENT:												
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POSITION TO FALSE			DANCY NG THE										
OPERATIO				-	_		-						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-468 05-6KF-2003	3 -1		DATA: LINE [] NEW [X]
MDAC ID:	FRCS 468 FUSE, 1A			
LEAD ANALYST:	D. HARTMAN		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	e de la companya de la companya de la companya de la companya de la companya de la companya de la companya de l La companya de la co
ASSESSMENT:				
CRITICAL: FLIGH	ITY REI	DUNDANCY	SCREENS	CIL ITEM
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COMPARE [/N] [N]] [и	ן (א)	[]
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ASSESSME ASSESSME NASA FME	NT	II		FRCS	5-4	169) ()3 -:	1					ASA DA BASELI A	INE		
SUBSYSTE MDAC ID: ITEM:	M:			FRCS 469 FUSI		17	A.										
LEAD ANA	LYS	ST	:	D. I	IAI	(TI	(A)	1									
ASSESSME	NT	:															
	CR:		ICAL: LIGH:				RI	EDUN	DAN	ICY	SCRE	EEN	S			CII	
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SUBSYSTE MDAC ID:	M:		FRCS 470 FUSE,	12	A												
LEAD ANA	LYSI	r:	D. HA	RTI	IAN	N.											
ASSESSME	NT:																
	I	ricali FLIGHT DW/FUN	ľ		RI A	EDUN	DAN	CY B	SCRE	EN	s C				IL PEM	ſ	
NASA IOA	[3	3 /1R 3 /3]	[P]	[P]	[P]		[]	*
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IOA AGREES WITH NASA FMEA.

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COMPARE	[/]		[]		[]	[]			[]	
RECOMMEN	DAT	'IC	ONS:		(If	d :	if	fere	ent	f	ro	om N	IASA))						
	[/]		(1		[]	[]		(AI	[a\ac		
* CIL RE	TEN	T	ION 1	RAT	CION	L	E:	(If	a	pp	l i	cab				UAT UAT]	
REMARKS:	REN	CI	ES.														- -		,	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-47 05-6KF-	2 2126 - 1		NASA DATA BASELINE NEW	
SUBSYSTEM:	FRCS 472 RELAY				**************************************
LEAD ANALYST:	D. HART	MAN	Living and the second		. 44.
ASSESSMENT:					
CRITICAL FLIGH HDW/FU	T	REDUNDA A	NCY SCRE	ENS C	CIL ITEM
•			_	_	
NASA [3 /1R IOA [2 /1R] [P] P]	[P] [F]	[P] [P]	[X]
COMPARE [N /] [1	[N]	[]	[N]
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)	
[2 /1R] [P]	[P]	[P]	[A] ADD/DELETE)
* CIL RETENTION	RATIONAL	E: (If a	pplicabl	e) ADEQUATE INADEQUATE	[]
REMARKS: WITH THE LOSS OF TO OPEN VALVE PR PROPELLANTS TO M	EVENTS O	PERATION	VE CANNO OF JETS	T BE OPENED.	INABILITY
ISSUE IS TIED TO VALVE 1/2 FAILED		DWARE CR	RITICALIT	Y FOR THE TA	ANK ISOLATION

ASSESSME ASSESSME NASA FME	NT NT A	Di II #:	ATE:	1/ FR 05	29/8 CS-4 -6KF	8 7 7-2	3 212	26 - :	2				-,	ASA DATA BASELINE NEW	[]		
SUBSYSTE MDAC ID: ITEM:				FR 47 RE															
LEAD ANA	LYS	ST	:	D.	HAF	(T	(A)	1				÷							
ASSESSME	NT	:																	
ı	CR:		ICAL LIGH				RE	DUNI	DAN	CY	SCRE	ENS	3		C:	L EM	4		
	1		W/FU				A			В			С				-		
NASA IOA	[2 3	/1R /3]]	P]]	F]	[P]	[X]	*	
COMPARE	[N	/N]		[N]	[N]	[N]	[N]		
RECOMMEN	DA'I	CIC	SMC:		(If	đi	lff	ere	nt :	fro	om NA	SA))						
	[3	/1R]		[P]	[P]	[P] .DD/			TE)	
* CIL RE	TEI	(TV	ION I	RAT	IONA	LI	E:	(If	apj	91 i	icabl		Δī	DEQUATE	г		1		
REMARKS:												I	IAI	DEQUATE DEQUATE	ĺ		j		
NASA FME. LOSS OF																			E
LEAK.														•					

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	NT I	D:	FRCS-	474		26 A -3	l.				-	ASA DA BASELI N	ΝĒ		
SUBSYSTE MDAC ID:			FRCS 474 RELAY	?								e a la se		. 5	andre i
LEAD ANA	LYST	:	D. HA	RTM	(A)	1									
ASSESSME	NT:														
		'ICAL 'LIGH	ITY T		RÍ	EDUNI	DAN	СŸ	SCR	EEN	5	ad		CIL	
	HD	W/FU	NC		A			В			C				
NASA IOA	[3	/1R /3]	[[P]	[P]	[[P]		[] *
COMPARE	[/N]	[N]	[N]	ι	N]		ι]
RECOMMEN	DATI	ons:	(If	di	.f1	ferei	nt :	fro	om N	ASA))				
	[/,]	[]	[]	[]	(AI	[DD/D] ELETE)
* CIL RE			, 1			(If	ap	pl:	icab			DEQUAT DEQUAT		[]
IOA AGRE	ES W	ITH	nasa i	MEA	٠.										

ASSESSMEI NASA FME	NT I	D:	FRO	CS-4	75	12	6 A- 2				-		SA DATA BASELINE NEW	[]		
SUBSYSTEM MDAC ID:	M:		FRO 475 REI	5														
LEAD ANA	LYST	:	D.	HAF	MT	AN												
ASSESSMEI	NT:																	
(CRITICALITY REDUNDANCY SCREENS FLIGHT HDW/FUNC A B C														IL PEM	[
	HD	w/ rui	NC															
NASA IOA	[3 [3	/1R /1R]												X X]	*	
COMPARE	[/]		[]	[]	[]	[]		
RECOMMEN	DATI	ons:	ı	(If	di	ff	erent	: 1	fro	om NA	ASA)	ı						
	[3	/3]		[]	[]	[] (A)		D DE		ETE)	
* CIL RE	rent:	ION 1	RATI	CONA	LE	:	(If a	pp) 1:	icab]	-		DEQUATE DEQUATE	[]		
NASA FME	A CO	NSID	ERS	MUI	ЛІ	PL	E FAI	L	JRI	ES.	TH	S	FAILURE	A)	ON	Œ	HAS	NO

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	NT :	ID:		-47		26A-	-1		N	ASA DAT BASELIN NE]
SUBSYSTE MDAC ID:	M:		FRCS 476 RELA	¥								
LEAD ANA	LYS'	T:	D. H	ART	MAI	N						
ASSESSME	NT:											
		TICAL: FLIGH			RI	EDUN	IDANCY	sc	REENS		CII	_
	H	DW/FU	NC		A		В		C	!		
NASA IOA	[:	3 /1R 3 /3]	[P]	[P]	[P]	[[] *]
COMPARE	[/N]	[N]	[N]	[N]	[]
RECOMMEN	DAT:	ions:	(I	f d	if	fere	ent fr	om	NASA)			
	[1	[]	[]	[] ([ADD/D] ELETE
* CIL RE	TEN'	TION 1	RATIO	NAL	Е:	(If	appl	ica		.DEQUATE	. [1
REMARKS: IOA AGRE	ES 1	WITH 1	NASA	FME	Α.					DEQUATE		j

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ASSESSME ASSESSME NASA FME	NT	I	D:	FR	CS-4	77	7 212	6A-2						ASA DATA BASELINE NEW	[]	
SUBSYSTE MDAC ID: ITEM:	M:			47	CS 7 LAY													
LEAD ANA	LY	ST	:	D.	HAI	T	IAN	ī							•			
ASSESSME	NT	:															784 (· · ·	
	CR:		ICAL		7		RE	EDUND	AN(CY	SCRE	ENS	3			IL PEN		
	1		W/FUI				A			В			С			<u> </u>	•	
NASA IOA						[P P]	[F F]	[P P]	[X X]	*
COMPARE	[N	/]		[]	[]	[]	[]	
RECOMMEN	'DA	TI	ons:		(If	d :	ifi	feren	t	fr	om NA	SA)					
	[2	/1R]		[P]	[F]	[P			A /DI		TE)
* CIL RE	TE	NT	ION 1	RAT	NOI	AL I	Ε:	(If	ap;	pl:	icabl			DEQUATE DEQUATE	[]	
REMARKS: NASA FME INABILIT REDUNDAN LIMITS.	A Y	то	OPE	ר א	THE Y	/A	LVI	E. R	ED	UNI	DANCY	P	ROY	FAILURE VIDED. ANTS TO	LO	SS	OF	ALL

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-478 05-6KF-2126 -1		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID:	FRCS		***	
LEAD ANALYST:	D. HARTMAN			**
ASSESSMENT:				
FLIGH'				CIL ITEM
HDW/FUI	NC A	В	C	
NASA [3 /1R IOA [2 /1R] [P]] [P]	[P] [[F] [P] P]	[x] *
COMPARE [N /] []	[и]]	[и]
RECOMMENDATIONS:	(If different	from NASA)		
[2 /1R] [P]	[P] [P] (Al	[A] DD/DELETE)
* CIL RETENTION	RATIONALE: (If a	oplicable)		
	· · · ·	IN	ADEQUATE ADEQUATE	[]
REMARKS: WITH THE LOSS OF TO OPEN VALVE PR PROPELLANTS TO M	EVENTS OPERATION	VE CANNOT B	E OPENED.	INABILITY
ISSUE IS TIED TO	IOA HARDWARE CR	ITICALITY F	OR THE TAI	NK ISOLATION

VALVE 1/2 FAILED CLOSED.

ASSESSME ASSESSME NASA FME	29/8 CS-4 -6KI	38 179	9 21:	26	- 2						DAT ELIN NE		[x]						
SUBSYSTE MDAC ID:	EM:			FR	.CS	•			_								•		•		
LEAD ANA	ALY	ST	•	D.	HAI	RT!	IAN	N													
ASSESSME	ENT	:																			
	CR		ICAL LIGH				RI	EDU	NDAN	CY	sc	CREEN	IS					L			
	=		W/FU				A			В			C	;				. 131			
NASA IOA]	2 3	/1R /3]		[P]]]	F]	[]	F)]			[X]	*	
COMPARE	[N	/N]		[N]	C	N]	[N	[]			[N]		
RECOMMEN	NDA	TI	ons:		(If	đ	if:	fer	ent	fr	om	NASA	١)								
	[3	/1R]		[P]	[P]	[F)	(AD				TE))
* CIL RI		NT	ION	RAT	'ION?	ΑL	Ε:	(I	f ap	pl:	ica			DEQ DEQ	UATE UATE	2	[]		
REMARKS: NASA FMI LOSS OF LEAK.	EA	CO L	NTAI HARD	ns War	MULT E RI	ri: EDI	PLI	E F DAN	'AILU ICY P	RE:	S. VEN	THI NTS I	s,	CO LAT	UPLE ION	D OF	WI A	TH.	I I HF:	HE	ГER
AT MEETI DISCUSSI DUE TO I	ED.		IT W	AS	AGRI	EE:	D 1	UPC	N TH	AΤ	TH	HE IS	SSU	JE R	AISE	ED.	ΑE	SOV	Æ	WAS	5 HE

ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	ENT I	D:	FRCS	-480		26 A -	1					ASA DA BASELI N		[x]	
SUBSYSTE MDAC ID:			FRCS 480 RELA														
LEAD ANA	LYSI	?:	D. H	ARTM	ΙΑΙ	1											
ASSESSME	ASSESSMENT:																
	F	LIGH			RI	EDUN	DAN	CY	SCR	EEN	s			CI	L EM	Ī	
	HD	W/FU	NC		A			В			С						
NASA IOA	[3	/1R /3]	[P]]	P]	[P]		[]	*
COMPARE	[/N]	[N]	C	N]	[N]		[]	
RECOMMEN	DATI	ons:	(I	f di	f1	ere	nt :	fro	om N	'ASA)						
		/]	[]	[]	[]	(AI	[OD/	DE] LE	TE;
* CIL RE REMARKS: IOA AGRE	ŧ		The second secon			(If	apı	91 1	icab	-		DEQUAT DEQUAT		[]	

NASA DATA:

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-481 05-6KF-212	26 A -2		ASA DATA: BASELINE NEW					
SUBSYSTEM: MDAC ID: ITEM:	FRCS 481 RELAY								
LEAD ANALYST:	D. HARTMAI	N							
ASSESSMENT:									
CRITICAL FLIGH		EDUNDANCY	SCREENS		CIL ITEM				
HDW/FU		В	С						
NASA [3 /1R IOA [3 /1R] [F] [P]	[X] * [X]				
COMPARE [/] [) [] []	[]				
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)						
[3 /3) [) [] [] (A	[D] DD/DELETE)				
* CIL RETENTION	* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []								
REMARKS: NASA FMEA CONSIL EFFECT.	ERS MULTIP	LE FAILUR	ES. THIS	FAILED	ALONE HAS NO				
AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS									

DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE

ISSUE REMAINS OPEN.

<u> </u>	ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	: 1/29/88 FRCS-482 05-6KF-2126A-1	NASA DATA BASELINE NEW	
	SUBSYSTEM: MDAC ID: ITEM:	FRCS 482 RELAY		
	LEAD ANALYST:	D. HARTMAN		
동역	ASSESSMENT:			
	CRITICA FLIC		Y SCREENS	CIL ITEM
===	HDW/H		ВС	77
¥74 	NASA [3 /1 IOA [3 /3	R] [P] [:	P] [P]] []	[] *
	COMPARE [/	иј [и] [1	и ј [и]	[]
	RECOMMENDATIONS	: (If different f	rom NASA)	\$ de
ESTATE OF THE STATE] [][] []	[] ADD/DELETE)	
	* CIL RETENTION	RATIONALE: (If app	licable) ADEQUATE INADEQUATE	[]
	REMARKS: IOA AGREES WITH	I NASA FMEA.	17 17 18 18 18 18 18 18 18 18 18 18 18 18 18 1	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-483	3 2126A-2		NASA DATA BASELINE NEW			
MDAC ID:	FRCS 483 RELAY						
LEAD ANALYST:	D. HARTY	IAN		er e e			
ASSESSMENT:							
CRITICAL: FLIGHT		REDUNDA	NCY SCRI	EENS	CIL ITEM		
HDW/FU		A	В	С			
NASA [3 /1R IOA [2 /1R] [P] P]	[F] [F]	[P] [P]	[X] * [X]		
COMPARE [N /] []	[]	[]	[]		
RECOMMENDATIONS:	(If di	ifferent	from N	ASA)			
[2 /1R	1 [P]	[F]		[A] ADD/DELETE)		
* CIL RETENTION I	RATIONALI	E: (If a	pplicabl	Le) ADEQUATE INADEQUATE	[]		
REMARKS: NASA FMEA CONSIDI INABILITY TO OPER REDUNDANCY CAUSES LIMITS.	THE VAI	VE. RE	DUNDANC	THIS FAILURE	CAUSES LOSS OF ALL		

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-484 05-6KF-2127A-1	NASA DATA: BASELINE [] NEW [X]
SUBSYSTEM: MDAC ID:	FRCS 484 RELAY	
LEAD ANALYST:	D. HARTMAN	
ASSESSMENT:		
CRITICAL	ITY REDUNDANCY SC	REENS CIL ITEM
HDW/FU	NC A B	C
NASA [3 /1R IOA [2 /1R	[P] [P] [P]	[P] []* [P] [X]
COMPARE [N /] [] []	[א]
RECOMMENDATIONS:	(If different from	NASA)
[2 /1R	[P] [F]	[P] [A] (ADD/DELETE)
	RATIONALE: (If applical	ble) ADEQUATE [] INADEQUATE []
TO OPEN VALVE PR PROPELLANTS TO M REDUNDANCY FOR M	THIS RELAY, VALVE CAN EVENTS OPERATION OF JE EET LANDING CG LIMITS. ANIFOLD 5 (VERNIERS - 2	ALSO THEIR IS NO
	ATION VALVE 3/4/5. TH	ICALITY FOR THE FAILED E VERNIER ISSUE (2/2)

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-48 05-6KF-	5 2127 A- 2		NASA DATA BASELINE NEW					
SUBSYSTEM: MDAC ID:	FRCS 485 RELAY			<u>.</u>					
LEAD ANALYST:	D. HART	MAN							
ASSESSMENT:									
CRITICAL FLIGH		REDUNDAN	CY SCREEN	_	CIL ITEM				
		A	В	c	=·				
NASA [2 /1R IOA [3 /3] [P] [F] [P]	[X] *				
COMPARE [N /N] [и ј [[и]	и]	[N]				
RECOMMENDATIONS:	(If d	ifferent	from NASA)					
[3 /1F	.] [P] [P] [[D] DD/DELETE)				
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []									
REMARKS: NASA FMEA CONSIDERS MULTIPLE FAILURES. HOWEVER, LOSS OF ALL REDUNDANCY PREVENTS ISOLATION OF A THRUSTER LEAK.									
AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS									

DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE

ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-486 05-6KF-21	.27 -1		'A: IE [] IW [X]		
	FRCS 486 RELAY					
LEAD ANALYST:	D. HARTMA	N.				
ASSESSMENT:						
CRITICAL FLIGH		REDUNDA	ancy sci	REENS	CIL ITEM	•
HDW/FU		L	В	C	1150	•
NASA [3 /1R IOA [3 /3] [F)]	[P] []	[P] []	[] *
COMPARE [/N] [N	1]	[N]	[א]	[]
RECOMMENDATIONS:	(If dif	ferent	t from h	NASA)		
] []	[]	[]	[(ADD/DE	
* CIL RETENTION	RATIONALE:	(If a	applical		e r	1
	er ville e			ADEQUATI	E [j
REMARKS: IOA AGREES WITH	NASA FMEA.	,		·		

ASSESSME ASSESSME NASA FME	NT I	D:	FRCS-	487	27 -	-2			ASA DA BASELI N		_	
SUBSYSTE MDAC ID: ITEM:	M:		FRCS 487 RELAY									
LEAD ANA	LYSI	C:	D. HA	. HARTMAN								
ASSESSME	ASSESSMENT:											
										L		
		FLIGH OW/FU	NC .	A		В		С		1.7	rem	
NASA IOA	[2	2 /1R 3 /1R]	[P]	[F]	[P]]	x] x]	*
COMPARE	[]	· /]	[]	[]	[1	[]	
RECOMMEN	DATI	ons:	(If	dif	fere	ent fr	om 1	NASA)				
	[3	3 /3]	[]	ſ]	[]	(ADD,	D]	TE)
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []												
	REMARKS: NASA FMEA CONSIDERS MULTIPLE FAILURES. THIS FAILED ALONE HAS NO											

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-488 05-6KF-212	27 - 1	;	NASA DATA BASELINE NEW]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 488 RELAY					<u> </u>
LEAD ANALYST:	D. HARTMAN	N				
ASSESSMENT:						
CRITICAL FLIGH	T	EDUNDANCY			CIL	M
HDW/FU	NC A	В		С		
NASA [3 /1R IOA [3 /3] [P] [P]	[[] *]
COMPARE [/N] [N) [N	j [n j	[]
RECOMMENDATIONS:	(If diff	ferent fro	om NASA)			
] [] [] [] (A	[.DD/D] ELETE)
* CIL RETENTION	RATIONALE:	(If appl:		ADEQUATE ADEQUATE	[]
REMARKS:	ИАСА БИБА		,		-	-

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	FRCS-48 05-6KF- FRCS			NASA DATA: BASELINE NEW	
MDAC ID: ITEM:	489 RELAY				
LEAD ANALYST:	D. HART	MAN			
ASSESSMENT:					
CRITICA FLIG		REDUNDA	NCY SCREI	Ens	CIL ITEM
HDW/F	JNC	A	В	С	
NASA [2 /1 IOA [2 /1	R] [P] P]	[F] [F]	[P] [P]	[X] * [X],
COMPARE [/] []	[]	[]	[]
RECOMMENDATIONS	: (If d	ifferent	from NAS	SA)	• .
[2 /1	R] [P]	[F]	[P] (AI	[A] DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If a	pplicable		
				ADEQUATE INADEQUATE	
REMARKS: NASA FMEA CONSI	DERS MULT	IPLE FAI	LURES. 7	THIS FAILURE	CAUSES
INABILITY TO OF REDUNDANCY CAUS LIMITS.	EN THE VA ES INABIL	LVE. RE	DUNDANCY XPEL PROI	PROVIDED. 1	LOSS OF ALL MEET CG

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSMENT DATE: 1 ASSESSMENT ID: F NASA FMEA #: 0	1/29/88 FRCS-490 05-6KF-2127A-1	NASA DATA: BASELINE [] NEW [X]				
SUBSYSTEM: F MDAC ID: 4 ITEM: F						
LEAD ANALYST:	D. HARTMAN					
ASSESSMENT:						
FLIGHT	redundan		SCREENS CIL ITEM			
HDW/FUNC	C A	В	С			
NASA [3 /1R] IOA [2 /1R]] [P] [] [P] [[P] [] [F] [P] P]	[x] *		
COMPARE [N /]) [] [[и]] .	[א]		
RECOMMENDATIONS:	(If different	from NASA)				
[2 /1R]] [P] [[F] [1	P] (AD	[A] D/DELETE)		
* CIL RETENTION RA	ATIONALE: (If ag	oplicable) IN	ADEQUATE ADEQUATE	[]		
REMARKS: WITH THE LOSS OF T TO OPEN VALVE PREV	VENTS OPERATION	OF JETS RE	QUIRED TO	EXPEL		
PROPELLANTS TO MEE REDUNDANCY FOR MAN			O THEIR IS	NO		
ISSUE IS TIED TO T CLOSED TANK ISOLAT REMAINS OPEN AS WE	TION VALVE 3/4/5					

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-49 05-6KF-	1 2127 A- 2		NASA DATA BASELINE NEW				
MDAC ID:	FRCS 491 RELAY							
LEAD ANALYST:	D. HART	MAN	-					
ASSESSMENT:								
		REDUNDA	NCY SCREEN	1S	CIL ITEM			
FLIGH HDW/FU		A	В	C	TIEM			
NASA [2 /1R IOA [3 /3] [P]	[F] []	[P] []	[X] *			
COMPARE [N /N] [и ј	[N]	[א]	[N]			
RECOMMENDATIONS:	(If d	ifferent	from NAS	A)				
[3 /1R] [Pj	[P]	[P] (A)	[D] DD/DELETE)			
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []								
REMARKS: NASA FMEA CONTAI LOSS OF ALL HARD LEAK.	NS MULTI WARE RED	PLE FAII UNDANCY	LURES. THE PREVENTS	IS, COUPLED ISOLATION O	WITH THE F A THRUSTER			
AT MEETING WITH DISCUSSED. IT W	SUBSYSTE AS AGREE	M MANAGI D UPON 1	ER ON 1/20, THAT THE IS	/88, NSTS 2: SSUE RAISED	2206 WAS ABOVE WAS			

DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE

ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	NT I		1/29 FRCS 05-6	-492		27 -	-1	NASA DATA: BASELINE [] NEW [X]					
SUBSYSTE MDAC ID:			FRCS 492 RELA	92 ELAY									
LEAD ANA	LYST	:	D. H	ARTI	IAN	V.							
ASSESSME	NT:												
		ICAL LIGH	ITY T		RI	EDUI	IDANCY	SCR	EENS			CIL	
	HD	W/FU	NC		A		В		C				
NASA IOA	[3 [3	/1R /3]]	P]	[P]	[F]		[[] *
COMPARE	[/N]	[N]	[1]	[N]		[]
RECOMMEN	DATI	ons:	(I	f d	if	fere	ent fr	om N	ASA)				
	[/]	[]	[]	[]	(A	[DD/D] ELETE)
* CIL RE	TENT	ION	RATIO	NALI	Ε:	(I1	f appl	icab	A	DEQUA		[]
REMARKS: IOA AGRE		ITH	NASA	FME2	Α.								i white .

ASSESSME ASSESSME NASA FME	NT	I	D:	FR	CS-4	193]			
SUBSYSTE MDAC ID: ITEM:	M:			FR 49 RE														
LEAD ANA	LYS	ST	:	D.	HAF	TY	(A)	1										
ASSESSME	NT:	:																
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM																		
	I		W/FUI				A			В			С		_		•	
NASA IOA			/1R /1R]		[P P]]]	F F]]	P P]	[X X] *	
COMPARE	[N	/]		[]	[]	[]	[]	
RECOMMEN	DA:	ric	ONS:		(If	đ	Ĺfi	feı	rent	fr		nasa))					
	[3	/3]		[]	[]	[]		D / DE] LETE)
ŧ	* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []																	
REMARKS: NASA FME EFFECT.	A (COI	NSIDI	ERS	MUI	LT]	[P]	LE	FAIL	UR	ES.	THI	[S	FAILED	ΑL	ONE	HAS	NO

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	NT ID:	1/29/ FRCS- 05-6F	494	1		NASA DA BASELI N		x]	
SUBSYSTE MDAC ID:		FRCS 494 RELAY	?					•	and the second
LEAD ANA	LYST:	D. H.	RTMA	N					
ASSESSME	NT:								
	CRITICAL FLIGH	T			IDANCY	SCR		CI	
	HDW/FU	INC	A		В		С		
NASA IOA		?]]	[P []	[P []	[P] []	[] *]
COMPARE	[/N	.]	[N]	[N]	[N]	[]
RECOMMEN	DATIONS:	(II)	dif	fere	ent fr	om N	ASA)		·
]	[]	ι]	[]	[(ADD/] DELETE)
	TENTION	RATION	VALE:	(If	appl	icab)	le) ADEQUAT INADEQUAT]
REMARKS:		MACA I	omer a						

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-495	NASA DATA: BASELINE NEW	
MDAC ID:	FRCS 495 RELAY		
LEAD ANALYST:	D. HARTMAN		
ASSESSMENT:			
CRITICAL		NCY SCREENS	CIL
FLIGHT HDW/FU		ВС	ITEM
NASA [2 /1R IOA [2 /1R] [P]] [P]	[F] [P] [F] [P]	[X] * [X]
COMPARE [/] []	[] []	[]
RECOMMENDATIONS:	(If different	from NASA)	
[2 /1R] [P]		[A] DD/DELETE)
* CIL RETENTION I	RATIONALE: (If a	pplicable) ADEQUATE INADEQUATE	
	THE VALVE. RE		OSS OF ALI

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

LIMITS.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-49 05-6KF-	: [] [X]			
SUBSYSTEM: MDAC ID:	FRCS				
LEAD ANALYST:	D. HARTI	MAN			
ASSESSMENT:					
CRITICALI FLIGHT HDW/FUN	ITY T NC		NCY SCRE	ENS C	CIL ITEM
NASA [3 /1R IOA [3 /3] [P]	[F]	[P]	[x] *
COMPARE [/N] [и ј	[N]	[N].	[N]
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)	
[3 /2R] [P]	[P]	[P] (A	[D] DD/DELETE)
* CIL RETENTION F	RATIONALI	E: (If a	pplicabl	e) ADEQUATE INADEQUATE	[]
REMARKS: NASA FMEA CONSIDE REDUNDANCY TO MON THE VALVE CLOSED.	IITOR VAI	IPLE FAI LVE POSI	LURES. TION MAY	HOWEVER, LOS	S OF ALL
AT MEETING WITH S DISCUSSED. IT WA DUE TO DIFFERENT	S AGREEI	UPON T	HAT THE	ISSUE RAISED	ABOVE WAS

ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	NT :	ID:	FRC	9/88 S-497 6KF-208	·2		N	ASA BASE	LINE]		
SUBSYSTE MDAC ID:			FRC: 497 RES:	S ISTOR,	1.2	K 2W							
LEAD ANA	LYS!	r:	D. 1	HARTMA	N		-						
ASSESSME	NT:												
		rical		R	EDUN	IDANCY	SCR	EENS			CII		
		FLIGH DW/FU		A		В	ВС			ITEM			
NASA IOA	[3 /3 3 /3]	[]	[[]	[]]] *] acces	
COMPARE	[/	3	C]	[.]	[3		[]	
RECOMMEN	DAT:	ions:	(If dif	fere	ent fr	om N	ASA)					
	[/]	[]	Ţ]	[]	(A	[DD/[] DELETE)	
* CIL RE			RATI	ONALE:	(If	appl	icab	A	DEQU DEQU		[]	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-498 05-6KF-208	33 -1	1	IASA DATA: BASELINE NEW	
SODSISIEM:	FRCS 498 RESISTOR,				
LEAD ANALYST:	D. HARTMAN	r			
ASSESSMENT:					
CRITICAL		DUNDANCY	SCREENS		CIL
FLIGH HDW/FU		В			ITEM
NASA [3 /1R IOA [3 /3] [P] [F] [F)]	[X] *
COMPARE [/N] [N] [N] [N]	[и]
RECOMMENDATIONS:	(If diff	erent fr	om NASA)		
[3 /2R] [P] [P] []		[D] D/DELETE)
* CIL RETENTION	RATIONALE:	(If appl			_
REMARKS:			A INA	DEQUATE DEQUATE	[]
NASA FMEA CONSID REDUNDANCY TO MO THE VALVE CLOSED	NITOR VALVE				
AT MEETING WITH DISCUSSED. IT W DUE TO DIFFERENT	AS AGREED U	PON THAT	THE ISSU	E RAISED	ABOVE WAS

ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	NT	ID:	FRCS-	1/29/88 NASA DATA: FRCS-499 BASELINE [] 05-6KF-2083 -2 NEW [X]									
SUBSYSTE MDAC ID: ITEM:	M:		FRCS 499 RESIS	TOR,	1.2K	2W							
LEAD ANA	LYS	T:	D. HA	RTMAI	Y		4	. ==	-		2		
ASSESSME	NT:												
		TICAL FLIGH	ITY	RI	EDUND	ANCY	SCRE	ENS	5	CI:			
			NC	A	в с								
NASA IOA	[3 /3 3 /3]	[]	[]	[]	[] *]		
COMPARE	[/]	[]	[]	ι]	[]		
RECOMMEN	DAT	ions:	(If	dif	feren	t fr	om NA	SA)	l				
	[/]	[]	()	[] (] DELETE)		
		TION		IALE:	(If	appl	icabl.		ADEQUATE NADEQUATE]		
REMARKS:		CES.	2 - W157 11 - 11										

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	: [x]						
	FRCS 500 RESISTO	R, 1.2	K 2W				- .
LEAD ANALYST:	D. HART	MAN		and the second			e e e
ASSESSMENT:							
CRITICAL FLIGH		REDUN	DANCY	SCREENS		CIL	
HDW/FU		A	В	(C		•
NASA [3 /1R IOA [3 /3] [P]	[F [] []	P]]	[X] *
COMPARE [/N] [N]	иј] []	ן א	[11]
RECOMMENDATIONS:	(If d	iffere	nt fro	m NASA)			
[3 /2R] [P]	[P] []		D] 1D \ DD] ELETE)
* CIL RETENTION	RATIONAL	E: (If	appli		ADEQUATE ADEQUATE	[]
REMARKS: NASA FMEA CONSID REDUNDANCY TO MO THE VALVE CLOSED	NITOR VA						

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSMI ASSESSMI NASA FMI	ENT	ID:	FRCS	-501	083 -	NASA DATA: BASELINE [] NEW [X]							
SUBSYSTE MDAC ID:			FRCS 501 RESI		, 1.2	2K 2W						-	
LEAD ANA	ALYS	T:	D. H	ARTM	AN								
ASSESSME	ENT:												
		TICAL	LITY	1	REDUN	IDANC'	SCR	EENS			CII		
_		DW/FU		1	4	1	3	(C		TIL	М	
NASA IOA	[3 /3 3 /3]	[]	[]	[]		[]	*
COMPARE	[/]	[]	(]	[]		[]	
RECOMMEN	IDAT	'IONS:	(I	f dif	fere	nt fi	om N	ASA)					
	[/]	[]	[]	[]	(A)	[DD/E] ELET	ΓE)
* CIL RE		TION	RATIO	NALE:	(If	appl	icab.	1	ADEQUA'		[]	
REMARKS:		CES.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-502 05-6KF-2081	1/29/88 NASA DATA FRCS-502 BASELINE D5-6KF-2081 -1 NEW									
SUBSYSTEM: MDAC ID: ITEM:	FRCS 502 RESISTOR, 5.	02 ESISTOR, 5.1K 1/4W									
LEAD ANALYST:	D. HARTMAN										
ASSESSMENT:											
FLIGH	ITY REDU T NC A	NDANCY SCRE	eens C	CIL ITEM							
•		r 1	f 1	r 1 +							
NASA [3 /3 IOA [3 /3	i i i			[] "							
COMPARE [/] []	[]	[]	[]							
RECOMMENDATIONS:	(If differ	ent from NA	ASA)								
[3 /2R] [P]	[P]	[P]	[] ADD/DELETE)							
* CIL RETENTION	RATIONALE: (I	f applicabl	le)								
			ADEQUATE INADEQUATE	[]							
REMARKS: THIS FAILURE MAY POSITION. REDUN TO FALSELY FAILI OPERATIONS.	DANCY PROVIDE	D. LOSS OF	F ALL REDUND	ANCY MAY LEAD							
ISSUE NOT RESOLV	ED AT MEETING	WITH SUBSY	STEM MANAGE	R ON 1/20/88.							

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-503 NASA FMEA #: 05-6KF-2081 -1											NASA BASE	DATA: LINE NEW	[]
SUBSYSTI MDAC ID ITEM:				FR 50 RE		or,								
LEAD AN	ALY:	ST	:	D.	HAI	RTMA	N							
ASSESSMI	ENT	:												
		F	ICAL LIGH W/FU	T		R		DANCY B	sc	CREENS	c ·		CIL	
NASA IOA	֝֟֝֟֝֟֝֟֝ <u>֟</u> ֪֪֓֞	3	/3 /3]		[]	[]]]		[] *
COMPARE	[/]		[]	[]	[3		[
RECOMME	NDA'	ri(ons:		(If	dif	fere	nt fro	om.	NASA)				
	Ĺ		/]		[1	[]	Ţ	j	(Al	[D/D] ELETE)
* CIL R	:							•		IN	ADEQU IADEQU	ATE	•]
A SHORT IOA REC FMEA.	AC:	RO EN	SS A DS R	RI EMO	R TY	(PE OF	RESI THE	STOR 1	r"	NOT A	CRED	IBLE DE FI	FAI ROM	LURE. THIS
ISSUE R	ESO FAI	LV LU	ED A	T M	EET:	ING BE	WITH REMO	SUBS!	rsi	rem ma	NAGER	ON :	1/20	/88

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-	504	82 - 1	NASA DATA: BASELINE [] NEW [X]							
	FRCS 504 RESIS	TOR,	5.1K	(1/4)	W						
LEAD ANALYST:	D. HA	RTMA	N								
ASSESSMENT:											
CRITICAI FLIGH		R	EDUNE	ANCY	SCRE	ens			CII		
	NC	A		В		С			#1E	ar i	
NASA [3 /3 IOA [3 /3]	[]	[]	[[]	i .	[] *]	
COMPARE [/	1	[]	[]	[]		[1	
RECOMMENDATIONS:	(If	dif	feren	nt fr	om NA	ŚA)		. Tip	· . · · · · · · · · · · · · · · · · · ·	.	
[3 /2F	R]	[P]	[P]	[P]	(A	[DD/E] ELETE)	
* CIL RETENTION	RATION	ALE:	(If	appl	icabl	À	DEQ DEQ	UATE UATE	[]	
REMARKS: THIS FAILURE MAY POSITION. REDUN TO FALSELY FAILI OPERATIONS.	IDANCY	PROV	IDED.	LO	SS OF	ALL	RE	DUNDA	NCY	MAY LEAD	
							-				

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSM ASSESSM NASA FM	ENT	I	D:		FF		505	082	-1				NASA BASE	DATA ELINE NEW	[[]	
SUBSYST: MDAC ID ITEM:					50	CS 5 SIST	ľOR	, 5.	. 1K	1/4	W						
LEAD AN	ALY	ST	:		D.	HAI	RTM	AN									
ASSESSM	ENT	:															
		F	LI	ALI GHI FUN	C			REDU A	JNDA	NCY B		CREENS	S C		CII		
	4	יעח	w/.	ror	10		,	A		D			C				
NASA IOA	[3	/	3 3]		[]		[]]]		[]	*
COMPARE	[/]		[]		[]	[]		[]	
RECOMME	NDA'	ri	ON	s:		(If	di	ffer	rent	fr	om	NASA)					
	[/]		[]		[]	[]	(Al	[DD/D] ELF	ETE)
* CIL R	ETE)	NT:	IO	N F	TAS	ION	ALE	: (1	(fa	ppl	ica	•	ADEQU IADEQU		[]	
REMARKS A SHORT IOA REC FMEA.	AC											NOT A	CREE	IBLE			
ISSUE R											YSI	TEM MA	NAGER	ON 1	1/20	/88	3

ASSESSMENT DATE: 1/29/8 ASSESSMENT ID: FRCS-9 NASA FMEA #: 05-6KB	506								
SUBSYSTEM: FRCS MDAC ID: 506 ITEM: RESIST	TOR, 5.1K	1/4W	11 J. 112	a the end					
LEAD ANALYST: D. HAI	RTMAN		en en en en en en en en en en en en en e	n e e e e e e e e e e e e e e e e e e e					
ASSESSMENT:									
CRITICALITY FLIGHT				CIL ITEM					
HDW/FUNC	A	В	С						
NASA [3 /3] IOA [3 /3]	[]	[]	[]	[] *					
COMPARE [/]	[]	[]	[]	[]					
RECOMMENDATIONS: (If	different	from NAS	SA)						
[3 /2R]	[P]	[P]		[DD/DELETE)					
* CIL RETENTION RATION	ALE: (If a	pplicable	ADEQUATE						
REMARKS: THIS FAILURE MAY CAUSE POSITION. REDUNDANCY I TO FALSELY FAILING THE OPERATIONS.	PROVIDED.	LOSS OF	INDICATION O ALL REDUNDA	F THE VALVE NCY MAY LEAI					
ISSUE NOT RESOLVED AT I	MEETING WI	TH SUBSYS	STEM MANAGER	ON 1/20/88.					

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-507 NASA FMEA #: 05-6KF-2082 -1]		DATA: ELINE NEW	[: -" = " · .		
SUBSYSTE MDAC ID: ITEM:					507	FRCS 507 RESISTOR, 5.1K 1/4W									1	3 \.:
LEAD ANA	LY	ST	:		D.	HAI	RTM2	AN		-	-		-			
ASSESSME	NТ	:														
		F	LI	GH'	r			REDUN	IDANCY B			C		CII	_	
	1	יעה	W/	rui	NC			•	E	•	•	-				
NASA IOA	[[3	/	'3 '3]		[]	[]	[]		[]	*
COMPARE	[/	•]		[]	[]	[]		[]	
RECOMMEN	DA!	ΓI	ON	ıs:	((If	di	ffere	ent fr	om N	IÀSA)		-			
	[/	•]		[]	[]	[]	(AI] ELI	ETE)
* CIL RE	ופיתי	ייינע	TO	ו אפ	ייי ב	ON	AT.E.	· /Tf	appl	icab	ale)					
			-					. (22	. uppa			ADEQU ADEQU	JATE JATE	[]	
REMARKS: A SHORT IOA RECO FMEA.	AC										A TO	CREI	DIBLE	FA]	LUI	
ISSUE RE	so	LV	ED) A'	r mi	ET:	ING	WITH	I SUBS	YSTE	M MAI	NAGEI	R ON 1	L/20)/88	3

(SHORT FAILURE MODE TO BE REMOVED).

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/29/88 FRCS-508 05-6KF-20)82 - 1		NASA DATA BASELINE NEW		
	FRCS 508 RESISTOR,					
LEAD ANALYST:	D. HARTMA	M				
ASSESSMENT:						
CRITICAL FLIGH	ITY R	REDUNDANCY	SCREEN	S	CIL ITEM	
	NC A	A I	3	C		
NASA [3 /3 IOA [3 /3] [] [] []	[]	*
COMPARE [/] [] [] [1	[]	
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)		
[3 /2R] [P	·] [[?] [P]	[]	
* CIL RETENTION	RATIONALE:	(If app		ADEQUATE NADEQUATE	[]	
REMARKS: THIS FAILURE MAY POSITION. REDUN TO FALSELY FAILI OPERATIONS.	DANCY PROV	IDED. LO	RATE IN	DICATION O	F THE Y	Y LEAD
ISSUE NOT RESOLV	ED AT MEET	ING WITH	SUBSYST	EM MANAGER	ON 1/2	20/88.

ASSESSMI ASSESSMI NASA FMI	ENT ENT EA	D/ II #:	ATE: D:	1/2 FRC 05-	9/88 S-509 6KF-20	82 -	-1		r	BASE		[5 - 7 %
SUBSYSTEMDAC ID	EM:			FRC 509	S									
LEAD AN	ALY	ST	:	D.	HARTMA	N								
ASSESSM	ENT	:												
	CR		ICAI LIGH		R	EDUN	IDANCY	SCR	EENS			CI		
]			NC	A	•	В		C	2				
NASA IOA	[3 3	/3 /3]	[[]	[]	[]		[]	*
COMPARE	[/]	[]	[]	[]		[]	
RECOMME	NDA'	TI	ons:	(If dif	fere	ent fr	om N	IASA)					
	[/]	[]	[]	[]			DELE	TE)
* CIL R		NT:	ION	RATI	ONALE:	(Ii	f appl	icab	7	ADEQUA	ATE ATE	[]	
REMARKS A SHORT IOA REC FMEA.	AC:	RO: EN	SS A	RLR REMOV	TYPE AL OF	RESI THE	ISTOR "SHOR	IS N T" F	OT A	CRED	IBLE DE FI	FA: ROM	ILUR THI	E.
ISSUE R								YSTE	M MAI	NAGER	ON 3	L/20	0/88	;

ASSESSME ASSESSME NASA FME	יחדבי	Ŧ	D.	TO T		= 1 A	081 -	-1		NASA DATA: BASELINE [] NEW [X]					
SUBSYSTE MDAC ID:				FF 51 RE	LO	ror,	, 5.2	lK 1/4	ıw						
LEAD ANA	LY	ST	:	D.	HA	RTM	AN								
ASSESSME	NT	:													
	CR		ICAL LIGH		?	I	REDUI	NDANCY	r sc	REENS		CI			
	1		W/FU	_		1	A	F	3	С			41.1		
NASA IOA]	3	/3 /3]		[]	[]]]]	*	
COMPARE	(/]		[]	[]	Ţ	3	[3		
RECOMMEN	DA'	TI(ons:		(If	dii	ffere	ent fr	om	NASA)					
	[3	/2R)		[]	?]	[])	[P		[ADD/I] DELE		
* CIL RE	TE	NT:	ION I	RAI	CION	ALE:	(I1	f appl	ica	· Al	DEQUATE	<u>[</u>]		
REMARKS: THIS FAI POSITION TO FALSE OPERATIO	LU LY	RI F	EDUN	DAN	ICY I	PRO	/IDEI	o. Lo	SS	E INDIC	REDUND	OF TI	HE V	LEAI	

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		-1		ATA: INE [] NEW [X]
	FRCS 511 RESISTOR, 5.	.1K 1/4W		
LEAD ANALYST:	D. HARTMAN			
ASSESSMENT:				
FLIGHT				CIL ITEM
·	NC A	В	С	
NASA [3 /3 IOA [3 /3] []	[]		
COMPARE [/] []	[]	[]	[]
RECOMMENDATIONS:	(If diffe	rent from	NASA)	
[/] []	[]	[]	[] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If applica	ble) ADEQUA INADEQUA	TE []
REMARKS: A SHORT ACROSS A IOA RECOMMENDS R FMEA.	RLR TYPE RE EMOVAL OF TH	SISTOR IS E "SHORT"	NOT A CREDI FAILURE MOD	BLE FAILURE. E FROM THIS
ISSUE RESOLVED A (SHORT FAILURE M	T MEETING WI	TH SUBSYST	'EM MANAGER	ON 1/20/88

ASSESSMENT DATE: 1 ASSESSMENT ID: F NASA FMEA #: 0	-//	NASA DATA: BASELINE [] NEW [X]
MDAC ID: 5	FRCS 512 RESISTOR, 5.1K 1/4W	ander van de veren de de de de de de de de de de de de de
LEAD ANALYST: D	D. HARTMAN	
ASSESSMENT:		
FLIGHT	redundancy screens	CIL ITEM C
] [] *
COMPARE [/]] []
RECOMMENDATIONS:	(If different from NASA)	
[3 /2R]] [P] [P] [P] [] (ADD/DELETE)
* CIL RETENTION RA	ATIONALE: (If applicable) IN	ADEQUATE [] ADEQUATE []
POSITION. REDUNDA	CAUSE LOSS OF ACCURATE IND ANCY PROVIDED. LOSS OF AL G THE VALVE CLOSED, POSSIB	COLUMN OF THE VALVE LEAD
ISSUE NOT RESOLVED	D AT MEETING WITH SUBSYSTE	MANAGER ON 1/20/88.

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-513 NASA FMEA #: 05-6KF-2081 -1									N		LINE [NEW [
SUBSYSTI MDAC ID ITEM:	EM:			FR0	CS								
LEAD AN	ALY	ST	:	D.	HARTMA	N			54 .		=	- 45	
ASSESSMI	ENT	:											
		F	LIGI	ΗT	F		DANCY B		REENS		CI IT	L EM	
		HD	w/rt	JNC	A	\	Б			•			
NASA IOA	[3 3	/3 /3]	[]]]]]	[[]	*
COMPARE	[/]	[3	[]	[]	[]	
RECOMME	NDA'	TI	ONS:	: ((If dif	fere	nt fr	om N	NASA)				
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* CIL R	ETE:	NT	ION	RAT	ONALE:	(If	appl	icak	P	DEQU.	ATE [ATE []	
REMARKS A SHORT IOA REC FMEA.	AC	RO: EN	SS 1 DS 1	A RLI REMOV	R TYPE VAL OF	RESI THE	STOR "SHOR	IS N	OT A	CRED	IBLE FA	ILUF	RE. Is
ISSUE R								YSTE	EM MAI	IAGER	ON 1/2	0/88	3

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-514 05-6KF-2084	-1	NASA DATA BASELINE NEV	(x)
SUBSYSTEM: MDAC ID: ITEM:		.2K 2W	-	, <u>-</u>
LEAD ANALYST:	D. HARTMAN			v
ASSESSMENT:				
	ITY REDU	INDANCY SCREI	ens	CIL ITEM
FLIGH HDW/FU	NC A	В	С	TIEM
NASA [3 /1R IOA [3 /3] [P]] []	[F] []	[P] []	[X] * []
COMPARE [/N] [N]	[N]	[N]	[и]
RECOMMENDATIONS:	(If differ	ent from NAS	5 A)	
[3 /2R] [P]	[P]	[P]	[D] ADD/DELETE)
* CIL RETENTION	RATIONALE: (]	[f applicable	e) ADEQUATE INADEQUATE	[]
REMARKS: NASA FMEA CONSID REDUNDANCY TO MO THE VALVE CLOSED	NITOR VALVE I	FAILURES. 1 POSITION MAY	HOWEVER, LOS LEAD TO FAI	SS OF ALL LSELY FAILING
AT MEETING WITH DISCUSSED. IT W DUE TO DIFFERENT	AS AGREED UPO	ON THAT THE	ISSUE RAISEI	ABOVE WAS

ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	NT I NT I A #:	DATE: [D:	1/29 FRCS 05-6	9/88 5-515 5KF-2	084 -	-2]	NASA DA' BASELI N		[2 1 m/z 1
SUBSYSTE MDAC ID: ITEM:			FRCS 515 RESI		, 1.2	K 2W			er i e, re			ngha (1965).
LEAD ANA	LYSI	r:	D. I	HARTM	AN			ET 6.5 " " " .	e e. · ·	7		2
ASSESSME	NT:											
		rical Fligh]	REDUN	IDANC	sci	REENS		CII		
				i	A	I	3	(3	111	71.7	
NASA IOA	[3	3 /3]	[]]]	[]	[]	*
COMPARE	[/	1	[3	Ţ]	[3	Ţ	3	
RECOMMEN	DAT	cons:	(1	[f di:	ffere	nt fi	om 1	NASA)				
	[/]	[]	[]	[]	[(ADD/I) ELE	
* CIL RE	TENT	NOIT	RATIO	ONALE	: (If	app]	lical]	
REMARKS:		CES.				- <u>1</u>		INZ	ADEQUATI	3 2	j	. Ā

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-516 05-6KF-20	084 -1	N2 I	ASA DATA: BASELINE [NEW [x]
SUBSYSTEM: MDAC ID:	FRCS 516 RESISTOR,				
LEAD ANALYST:	D. HARTMA	N.			
ASSESSMENT:					
FLIGH'		REDUNDANCY A B		I	TEM
NASA [3 /1R IOA [3 /3] [P	?] [F] [P] [x] *
COMPARE [/N] [N	и) [и] [N] [N]
RECOMMENDATIONS:	(If dif	fferent fr	om NASA)		
[3 /2R] [F	P] [P] [P		D] D/DELETE)
* CIL RETENTION	RATIONALE:	: (If appl	icable) A INA	DEQUATE [DEQUATE []
REMARKS: NASA FMEA CONSID REDUNDANCY TO MO THE VALVE CLOSED	NITOR VALV	PLE FAILUR VE POSITIO	ES. HOWE N MAY LEA	VER, LOSS D TO FALSE	OF ALL LLY FAILING
AT MEETING WITH DISCUSSED. IT W	SUBSYSTEM AS AGREED	MANAGER OUPON THAT	N 1/20/88 THE ISSU	, NSTS 222 E RAISED A	206 WAS ABOVE WAS

DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE

ISSUE REMAINS OPEN.

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-517 NASA FMEA #: 05-6KF-2084 -2														DATA ELINE NEW	[
SUBSYSTE MDAC ID: ITEM:				51	RCS 17 ESISTOR, 1.2K 2W . HARTMAN												
LEAD ANA	LY	ST	:	D.	HART	MA	N										
ASSESSME	NT	:															
	CR		ICAL:		•	R	EDU	NDA	NC	S	CREEI	ıs			CI		
	1		LIGH W/FUI			A			I	3		С			11.	<u>G</u> PI	
NASA IOA	[3	/3 /3]	[· :]		[]	!	•]	=	[]	*
COMPARE	[/]	ĺ	•)		[]	1	•]		[]	
RECOMMEN	DA!	ri	ons:		(If d	lif	fer	ent	fı	com	NASA	A)					
	[3	/2R]	ĺ	P)		[]	?]		P]	(A		DELI	ETE)
* CIL RE		NT:	ION 1	RAT	'IONAI	E:	(I	f a	pp]	lica		A		UATE UATE]	•
NO DIFFE		NC:	ES.														-

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-518 05-6KF-20)84 - 1		NASA DATA BASELINE NEW	
SODS IS IEM.	FRCS 518 RESISTOR,				
LEAD ANALYST:	D. HARTMA	N.			
ASSESSMENT:					
ČŘÍTICAI FLIGH		REDUNDAN	NCY SCREE	ns	CIL ITEM
-	INC A	7	В	С	2 2 44.1
NASA [3 /1F IOA [3 /3	R] [F) 	[F]	[P] []	[X] *
COMPARE [/N] []	1]	[и]	[и]	[N]
RECOMMENDATIONS:	(If dif	fferent	from NAS	A)	
[3 /2]	R] [E	?] [[P]		[D] DD/DELETE)
* CIL RETENTION	RATIONALE:	: (If a	pplicable	ADEQUATE	[]
REMARKS: NASA FMEA CONSII REDUNDANCY TO MO THE VALVE CLOSEI	ONITOR VALV	PLE FAII VE POSI	LURES. H TION MAY	OWEVER, LOS LEAD TO FAL	S OF ALL SELY FAILING
AT MEETING WITH DISCUSSED. IT V DUE TO DIFFERENT	VAS AGREED	UPON TI	HAT THE I	SSUE RAISED	ABOVE WAS

ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	II):	FRC	5-519	-2		N		DATA LINE NEW	[x]			
SUBSYSTE MDAC ID:				FRC: 519 RES	s Istor,	1.2								
LEAD ANA	LYS	ST	:	D. 1	HARTMA	N				-				
ASSESSME	NT	:												
	CR.		ICAI LIGH		R	EDUN	IDANCY	SCR	REENS			CI		
	I			INC	A		В		C	:				
NASA IOA]	3 3	/3 /3]]]	[]	[]		[[]	*
COMPARE	[/]	[]	[]	[]		[]	
RECOMMEN	DA'	ric	ons:	(If dif	fere	ent fr	om N	(ASA					
	[/]	[]	[]	[]	(A	[DD/	DEL.	ETE)
* CIL RE				RATI	ONALE:	(If	appl	icab	A		ATE ATE	[]	
MA DILLE	وبداعه													

and the second second

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-5	20	86 -1				ASA DATA BASELINE NEW		:]			
SUBSYSTEM: MDAC ID: ITEM:	FRCS 520 RESIST	OR,	5.1K	1/41	W							
LEAD ANALYST:	D. HAR	(AMT	N				-					
ASSESSMENT:												
CRITICAL FLIGH		R	EĎUND	ANCY	SCRE	ens		CIL	=			
HDW/FU	NC	A		В		С						
NASA [3 /3 IOA [3 /3]	[]	[]]]	[[] *]			
COMPARE [/	1	[]	C]	[1	[]			
RECOMMENDATIONS:	(If	dif:	feren	t fr	om NA	SA)						
[3 /2R]	[P	1	[P)	[P] (A	[] ELETE)			
* CIL RETENTION	RATIONA	LE:	(If	appl:	icable	A	DEQUATE DEQUATE]			
INADEQUATE [] REMARKS: THIS FAILURE MAY CAUSE LOSS OF ACCURATE INDICATION OF THE VALVE POSITION. REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY MAY LEAD TO FALSELY FAILING THE VALVE CLOSED, POSSIBLY EFFECTING MISSION OPERATIONS.												
ISSUE NOT RESOLV	ED AT M	EET	ING W	ITH S	SUBSY	STEM	MANAGER	ON	1/20/88.			

ASSESSMI ASSESSMI NASA FMI	Di II	ATE:	: 1/29 FRCS 05-6	/88 -521 KF-20		N		DATA: LINE NEW	[
SUBSYSTI MDAC ID: ITEM:	EM:			FRCS 521	1		K 1/4			."11				
LEAD AN	ALY	ST	:	D. H	ARTM	AN								
ASSESSMI	ENT	:												
	CR		ICA: LIG	LITY	I	REDUN	DANCY	SCF	REENS			CII		
	1	_		UNC		C	2			•				
NASA IOA	[3 3	/3 /3]	[]	[]]]		[] *	
COMPARE	[/	3	[]	[]	[3		[]	
RECOMME	NDA'	ΓI	ONS	: (1	f di	ffere	nt fr	om N	NASA)					
	[/]	C]	[]	[]	(Al	[DD/I] ELET	E)
* CIL R	ETE	NT		RATIO	NALE:	: (If	appl	icak	7	ADEQU ADEQU	JATE JATE	[]	
REMARKS A SHORT IOA REC FMEA.	AC	RO EN	SS DS	A RLR REMOVA	TYPE AL OF	RESI THE	STOR "SHOR	IS N T" I	A TO	CRED	IBLE	FA:	LURE	
ISSUE R	ESO FAI	LV LU	ED RE	AT MEI MODE T	ETING TO BE	WITH	SUBS	YSTI	em mai	NAGEF	ON :	1/20	/88	

ASSESSMENT ASSESSMENT NASA FMEA	1/29/8 FRCS-9 05-6K		ASA DATA BASELINE NEW		•								
SUBSYSTEM: MDAC ID: ITEM:			FRCS 522 RESIS										
LEAD ANALY	ST	:	D. HAI	RTMA	Ŋ								
ASSESSMENT	:												
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM													
FLIGHT HDW/FUNC A B C													
NASA [IOA [3	/3 /3]	*	
COMPARE [/	1	[]	[]	[]	[]		
RECOMMENDA	TIC	ONS:	(If	dif	feren	t fro	om NA	SA)					
[3	/2R]	[P	1	[P]	[P] (A)	[DD/D			
* CIL RETE	* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []												
REMARKS: THIS FAILURE MAY CAUSE LOSS OF ACCURATE INDICATION OF THE VALVE POSITION. REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY MAY LEAD TO FALSELY FAILING THE VALVE CLOSED, POSSIBLY EFFECTING MISSION OPERATIONS.													

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSMI ASSESSMI NASA FMI	ENT	II):	FRC	5-523)85 -	·1		ì	IASA BASE		[
SUBSYSTI MDAC ID ITEM:				FRC: 523 RES:		5.1	.K 1/4V	. 7		d description of			F 4 1	
LEAD AN	ALY	ST	:	D. 1	HARTMA	M				=				n on water
ASSESSM	ENT	:												
	CR				I	REDUN	IDANCY	sc	REENS			CII		
FLIGHT HDW/FUNC A B C												,	•	
NASA IOA]	3	/3 /3]	[[]	[]]]		נ נ]	*
COMPARE	[/]	ĺ]	[]	[]		[]	
RECOMME	NDA'	ΓI	ONS	: (If di	fere	ent fro	m	NASA)					
	C		/	1	C]	[]	[3	(A)	[DD/[ELI	ETE)
* CIL R	ETE:	NT:	ION	RATI	ONALE	: (I1	f appl:	ica	i	ADEQU ADEQU	ATE]	
REMARKS A SHORT IOA REC FMEA.	AC	RO EN	SS DS	A RLR REMOV	TYPE AL OF	RESI THE	STOR :	IS I"	NOT A	CRED	IBLE DE F	FA] ROM	LUI TH	RE. IS
ISSUE R	ESO	LV	ED	AT ME	ETING	WITH	I SUBS	rsi	EM MAI	NAGER	ON	1/20	/88	3

(SHORT FAILURE MODE TO BE REMOVED).

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FDCC-524	86 - 1	ì	NASA DATA: BASELINE NEW]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 524 RESISTOR,	5.1K 1/4V	N			
LEAD ANALYST:	D. HARTMA	N		21	er 11 -	·
ASSESSMENT:						
CRITICAL FLIGH		EDUNDANCY	SCREENS		CIL ITEM	
	NC A	В	(2	1141	
NASA [3 /3 IOA [3 /3] [] [] []	[] *]
COMPARE [/] [] [] []	[]
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)			
[3 /2R] [P] [P] [1	P]	[DD/DE:] LETE)
* CIL RETENTION	RATIONALE:	(If appl	1	ADEQUATE ADEQUATE	[]
REMARKS: THIS FAILURE MAY POSITION. REDUN TO FALSELY FAILI OPERATIONS.	CAUSE LOS DANCY PROV NG THE VAL	S OF ACCU IDED. LO VE CLOSED	RATE IND SS OF AL , POSSIB	CATION OL L REDUNDAL LY EFFECT	F THE NCY M ING M	VALVE AY LEAI ISSION
ISSUE NOT RESOLV	ED AT MEET	ING WITH	SUBSYSTE	M MANAGER	ON 1	/20/88

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-525 05-6KF-2	5 2086 - 1		NASA DATA: BASELINE NEW								
	FRCS 525 RESISTO	R, 5.1K	1/4W	arti ekir	i in atema							
LEAD ANALYST:	D. HARTI	MAN										
ASSESSMENT:												
CRITICAI FLIGH		REDUNDA	NCY SCREEN	S	CIL							
	NC	A	В	С	11111							
NASA [3 /3 IOA [3 /3] []].] []] []]	[] *							
COMPARE [/] [1	נ ז נ	1	[]							
RECOMMENDATIONS:	(If d	ifferent	from NASA)								
[/	1 [1 .	נ ז נ] (AÏ	[] DD/DELETE)							
* CIL RETENTION	RATIONALI	E: (If a		ADEQUATE NADEQUATE								
REMARKS: A SHORT ACROSS A RLR TYPE RESISTOR IS NOT A CREDIBLE FAILURE. IOA RECOMMENDS REMOVAL OF THE "SHORT" FAILURE MODE FROM THIS FMEA.												
ISSUE RESOLVED A				ANAGER ON 1	./20/88							

C-484

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-526 NASA FMEA #: 05-6KF-2085 -1											DATA: LINE NEW	[3	
SUBSYSTE MDAC ID:				FRC 526 RES		₹, 5.	1K 1/4	1W				ш.		
LEAD ANA	LY	ST	:	D. 3	HARTI	IAN				2				
ASSESSME	NT	:												
	CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM													
													M	
NASA [3/3] [] [] [] [] IOA [3/3] [] []												[] *	
COMPARE	[/	3	[]	[]	C	3		[3	
RECOMMEN	IDA	TI	ons:	(If di	iffer	ent fi	rom l	NASA)					
	[3	/2R	ו	[P]	[]	Pj	[P]	(AI] DELETE)	
* CIL RE		NT	ION	RATI	ONÁĽ	E: (I	f app	Lical	A	DEQU DEQU		[
REMARKS: THIS FAILURE MAY CAUSE LOSS OF ACCURATE INDICATION OF THE VALVE POSITION. REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY MAY LEAD TO FALSELY FAILING THE VALVE CLOSED, POSSIBLY EFFECTING MISSION OPERATIONS.														
ISSUE NO	ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.													

ASSESSMI ASSESSMI NASA FMI	TW	T	D:	FR	CS-527	7 2085 ·	-1				DATA ELINE NEW	[
SUBSYSTI MDAC ID: ITEM:				FR 52 RE		R, 5.	1K 1/4	W						
LEAD ANA	LY	ST	:	D.	HARTI	IAN								
ASSESSMI	ENT	:												
		F	LIC	HT			NDANCY	s	CREENS			CI IT	-	
	1	HD	W/I	TUNC		A	В	3		C				
NASA IOA	[[3 3	/3]	[]	[]	[]		[]	*
COMPARE	ľ		/]	[]	Ţ]	[]		(]	
RECOMMEN	IDA'	TI	ONS	5 :	(If di	ffer	ent fr	om	NASA)					
	[/)	[]	1]	[]	(A)		DEL:	ETE)
* CIL RI	ETE	NT:	IOI	I RAT	'IONALI	E: (I:	f appl	ica			JATE	-]	
REMARKS: A SHORT IOA RECO FMEA.	AC:	EN	DS	REMO	VAL O	THE	ISTOR "SHOR	T"	NOT A	CREI	DIBLE DDE FI	FA ROM	ILUI TH	RE. IS
TCCIIE DI	5CO	T 77	ED	am w	room TX1/	• ኔታጠ	u ciipc	Ven	PÉM M	NACEI	. ОИ .	1 /2	 በ / ደ!	 Ω

ISSUE RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88 (SHORT FAILURE MODE TO BE REMOVED).

ASSESSME ASSESSME NASA FME	NT				86 -	1			asa i Basei	LINE	-]		
SUBSYSTE MDAC ID:			FRCS 528 RESI	STOR,	5.1	K 1/4	W							
LEAD ANA	LYS	T:	D. H.	ARTMA	N						-			
ASSESSME	NT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C														
	FLIGHT ITEM HDW/FUNC A B C													
NASA IOA	[[3 /3 3 /3]	[[]	[]	[]		[]	*	
COMPARE	[/]	[]	[]	[)		[]		
RECOMMEN	DAT	ions:	(I	f dif	fere	nt fr	om N	IASA)						
	[3 /2R]	[P]	[P]	[P]	(A	[.DD/I		ETE)	
* CIL RE	TEN			NALE:	(If	appl	icab		DEALL	.me	•	,		
			1 . 1.1.						DEQU <i>I</i> DEQU <i>I</i>]		
REMARKS: THIS FAI POSITION TO FALSE OPERATION	LUR LY	REDUN	DANCY	PROV	IDED	. LO	SS C	F ALL	REDU	JNDA	NCY	MA	Y LEAD	

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSMI ASSESSMI NASA FMI	ENT ENT EA	Di II #:	ATE:	FRC 05-	9/88 S-529 6KF-20	86 -	-1		-		DATA ELINE NEW	[] -	
SUBSYSTI MDAC ID: ITEM:	CM:			529	•									
LEAD AN	ALYS	ST	:	D. 3	HARTMA	N								
ASSESSMI	ENT:	:												
	CR				R	EDUI	NDANCY	sc	REENS			CII		
	1		LIGH W/F		A		В	}	c	:		111	3141	
NASA IOA]	3	/3 /3]	[]	[]	[]		[]	*
COMPARE	[/]	[]	[]	[]		[1	
RECOMME	NDA'	ΓI	ONS:	: (If dif	fer	ent fr	om	NASA)		-			
	[/]	[]	ſ)	[]	(A)) ELE	ETE)
* CIL R		NT:	ION	RATI	ONALE:	(I:	f appl	ica	2	DEQU	JATE JATE	[]	
REMARKS A SHORT IOA REC FMEA.	AC	RO: EN	SS 1 DS 1	A RLR REMOV	TYPE AL OF	RES: THE	ISTOR "SHOR	IS T"	NOT A FAILUF	CREI	DIBLE DDE FI	FAI ROM	LUF TH	Œ.
ISSUE RI									'EM MAN	IAGEI	R ON :	1/20)/88	3

ASSESSMENT D ASSESSMENT I NASA FMEA #:	D: FRCS-	·530	1	NASA I BASEI	DATA: LINE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 530 RESIS	STOR, 5.1	K 1/4W		
LEAD ANALYST	: D. HA	ARTMAN			
ASSESSMENT:					
	ICALITY LIGHT	REDUN			CIL ITEM
HD.	W/FUNC	A	В	C	
NASA [3 IOA [3	/3]	[]	[]	[]	[] *
COMPARE [/]	[]	[]	[]	[]
RECOMMENDATI	•			•	
[3	/2R]	[P]	[P]	[P]	[] (ADD/DELETE)
* CIL RETENT	ION RATION	NALE: (If	applica		ATE [] ATE []
POSITION. R	EDUNDANCY	PROVIDED	. Loss	TE INDICATION OF ALL REDU	ON OF THE VALVE INDANCY MAY LEAD FECTING MISSION
ISSUE NOT RE	SOLVED AT	MEETING	WITH SU	BSYSTEM MANA	AGER ON 1/20/88.

ASSESSMI ASSESSMI NASA FMI				-	-)86 -	-1]	NASA Base		[k]	
SUBSYSTI MDAC ID: ITEM:	EM:			FRC 531	:s									
LEAD AN	ALY	ST	:	D.	HARTM	AN .								
ASSESSMI	ENT	:												
	CR		ICA LIG		I	REDUM	IDANCY	SCR	EENS			CII		
	1				1	A	В	}	(2				
NASA IOA	[3 3	/3 /3]	[[]	[]	[]_	-	[] *	
COMPARE	[/]	[]	ĺ]	[3		[]	
RECOMME	NDA'	TI	ONS	: (If dia	fere	ent fr	om N	ASA)					
	[/)	ľ]	. (]	[]	(A	[I\QQ] DELET	E)
* CIL R	ETE:	NT	ION	RATI	ONALE	: (Ii	appl	icab		ADEQU ADEQU	ATE ATE	[]	
REMARKS A SHORT IOA REC FMEA.	AC	RO EN	SS DS	A RLE REMOV	R TYPE	RESI THE	STOR "SHOR	IS N	OT A	CRED	IBLE	FA.	LURE	•,,.
ISSUE R								YSTE	m mai	NAGER	ON	1/20)/88	

	ASSESSI ASSESSI NASA FI	MENT	ľ	D:		532				1	NASA DATA BASELINI NEV]	•
	SUBSYST MDAC II ITEM:				FRCS 532 OX &	FU T	K ISC)L VL	V 1/2	SWI	ГТСН			
110 0	LEAD A	NALY	ST	:										
	ASSESSI	1EN]	?:											
خية		CF		ICAL LIGH	ITY T	R	EDUND	ANCY	SCRE	ens		CII		
نسا						A	•	В		C		7.727	= T-E-E .	
	NAS? IO?	A [3	/3]	[]	[]	[]	[]	*
	COMPARI	፻ [N	/N]	[]	[]	[1	[]	
_	RECOMM	ENDA	TI	ons:	(If	dif	feren	t fr	om NA	SA)				
		[•	/]	[]	[]	[] (2	[\DD/I) ELE	TE)
= :	* CIL I	RETE	NT	ION	RATION	ALE:	(If	appl	icable		DE0111 ME		-	÷
-		_			.01. +	ing garage tag					ADEQUATE ADEQUATE]	
	REMARKS OXIDIZE IOA. S	ER A	ND AS	FUE SESS	L TANK MENT I	ISO Ds F	LATIO RCS 1	N VA	LVE 1, X-110	/2 S B9X.	WITCH RE	-ANA	LYZ	ED BY

ASSESSMEN ASSESSMEN NASA FMEA	T II		FR	CS-5	33	}								DATA: LINE NEW	Γ]			
SUBSYSTEM MDAC ID: ITEM:			FROM 53	3	·U	тĸ	iso	or 1)L\	7 1,	/2 S	WIT	гсн						
LEAD ANAL	YST	:																	al -
ASSESSMEN	T:																		
C	F	CAL LIGH V/FU	r				DUNI		CY B	SCI	REEN	s C			CIL				
NASA IOA	[3	/ /1R]		[P]	[P]	[P]		[]	*		
COMPARE	[N	/N].		[N]	[N]	[N]		[]			
RECOMMEND	ATI	ONS:		(If	đi	ff	erei	nt :	fro	om 1	NASA	.)							
	[/]		[]	[]	[]	(AI	[DD/D:] ELI	ETE)		
* CIL RET	ENT	ION :	RAT	IONZ	ALI	Ē:	(If	apj	p 1:	[Ca]	ole) I	A NA	DEQU DEQU	ATE ATE	[]			
REMARKS: OXIDIZER IOA. SEE	AND AS	FUE SESS	L T MEN	ANK T II	IS Os	FR	ATIO	ON 1	VA1 852	LVE K-1:	1/2 1089	X.	WITC	H RE-	-ANA	LY2	ED	BY	<u>.</u>

ASSESSME ASSESSME NASA FME	NT I	D:	FRCS-	534							SA DAT ASELIN NI		[]	
SUBSYSTEMDAC ID:			FRCS 534 OX &	FU T	K IS	or A	'LV	7 1/2	2 SW	IITO	ЭН				
LEAD ANA	LYSI	r:													
ASSESSME	NT:														
		rical: Fligh	ITY	R	EDUN:	DANC	Y	SCRI	EENS	;			CIL		
		W/FU		A			В			С			1111	.1	
NASA IOA	[3	/ 3 /1R]	[[P]	[[P]]	P	l I		[[] *	t
COMPARE	[]	N / N]	[N]	[N)	[N :	1		[]	
RECOMMEN	DATI	cons:	(If	dif	fere	nt f	rc	om N2	ASA)						
	(/]	[]	[] .	[•	(AI	[DD/D		ΓE)
* CIL RE	TENT	CION I	RATION	ALE:	(If	app	11	cab:				_	_	_	
									IN	ADI IADI	EQUATI	€ €	[]	
REMARKS: OXIDIZER IOA. SE	ANI E AS	FUE:	L TANK MENT I	ISO Ds F	LATI RCS	ON V 1108	'AI	CVE :	1/2 0893	sw:	тсн і	RE-	-ANA	LYZI	ED B

ASSESSMEN ASSESSMEN NASA FME	TK	II		FR	CS-53	5							DATA: ELINE NEW	[]	
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LEAD ANALYST:							
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LEAD ANA	LY	ST	:											
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LEAD ANA	LYST:					
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MDAC ID:	FRCS 552 OX & FU	TK ISOL V	/LV 3/4,	/5 SWITCH G	PC CONTACTS 3,
LEAD ANALYST:					
ASSESSMENT:					
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LEAD ANA	LYST	:											
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SUBSYSTEMDAC ID: ITEM: 5, 6			FRC 554 OX	SWITCH	CLOSE	CONTACTS					
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LEAD ANALYST:					
ASSESSMENT:					
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ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:				NASA DAT BASELIN NE]							
SUBSYSTEM: MDAC ID: ITEM: 10	FRCS 558 OX & FU T	k isol vi	.V 3/4/5	S SWITCH G	SPC CO	NTACTS 9							
LEAD ANALYST:													
ASSESSMENT:													
CRITICA FLIG HDW/FU	HT	EDUNDANCY		is C	CIL								
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RECOMMENDATIONS	-	ferent fr	om NAS	A)									
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* CIL RETENTION		(If appl		ADEQUATI]							
REMARKS: OXIDIZER AND FU	EL TANK ISO				H RE-A	NALYZED							

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SUBSYSTEM MDAC ID: ITEM:	1 :		FRCS 559 OX &	FU TI	K ISOI	C VL	7 3/4/	/5 :	SWITCH	GPC	CON	VTACTS 9
LEAD ANAI	LYST	:										
ASSESSMEN	T:										- : .	se se c
c			TTY.	RI	EDUND <i>A</i>	NCY	SCREE	ENS			CIL	
		IGHT /FUN	1C	A		В		•	С		TIE	1
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* CIL RET								INZ	ADEQUAT ADEQUAT	E	Č	•
OXIDIZER BY IOA.			L TANK ESSMEN							CH F	E-AN	IALYZED

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:				NASA DA BASEL]
MDAC ID:	FRCS 560 OX & FU T	K ISOL VL	V 3/4/5	SWITCH	CLOSE	CONTACTS
LEAD ANALYST:						
ASSESSMENT:						
CRITICA FLIG		EDUNDANCY	SCREEN	S	CI: IT:	-
	INC A	В	ı	C		
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COMPARE [N /N] [] [] [1	ι	1
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* CIL RETENTION		(If appl		ADEQUA NADEQUA	TE []
REMARKS: OXIDIZER AND FULL BY TOA SEE ASS			LVE 3/4	/5 SWIT		

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SUBSYSTE MDAC ID: ITEM: 11, 12				FRC 561 OX		י יני ז	K I	SOL	ΛΓ	V 3/	/4/5	sı	WITCH	CLC	OSE	CONT	ACTS
LEAD ANA	LYS	ST	:														
ASSESSME	NT	:															
		F	ICAL: LIGH' W/FUI	r				NDAN	ICY B	SCI	REEN	s c			CII		
			,	•		••											
NASA IOA	[3	/ /1R]) (P]	[]	F]]	P]		[}] *	
COMPARE	[N	/N]	[N]	[N]	[N]		[]	ıj	
RECOMMEN	DA:	rI(ons:	(If d	if	fer	ent	fr	om 1	NASA)					
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* CIL RE REMARKS: OXIDIZER							·		-		I	NAI	DEQUA' DEQUA' SWIT	ΓE	Ì		ZED
BY IOA.			ASS														

ASSESSMENT DATE: ASSESSMENT ID: FRCS-562 NASA FMEA #:																DA' ELI N		[,]	
SUBSYSTE MDAC ID:				FRO 562 COI	2	LIL	EI	₹,	REMO	тс	E	POWE	R								
LEAD ANA	LY	ST	:																		
ASSESSME	NT	:																			
	CR		ICAL LIGH				RI	EDU	JNDAJ	NC	Ÿ	SCRE	EN	S				CI			
	•		W/FU				A				В			С				11	em.		
NASA IOA	[3	/ /2R]		[P]		[P]	[P]			[]	*
COMPARE	[N	/N]		[N]			N]	[N]			[]	
RECOMMEN	DA	TI	ons:		(If o	li	fi	feı	rent	f	ro	om NA	SA)							
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* CIL RE	TE	NT:	ION	RAT:	IONA	ĹΕ	:	()	If a	рp	1 i	icabl	e)				_	_			
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REMARKS: FORWARD CHANGE T	MA																				

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SUBSYST				FRCS 563 CONTR	OLLE	R, RE	MOTE	POWEI	R				
LEAD AN	ALY	ST	:										
ASSESSM	ENT	:											
	CR			ITY	R	EDUND	ANCY	SCREI	ens			CIL	vr
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REMARKS FORWARD	MA												

ASSESSME ASSESSME NASA FME	NT ID:	FRCS-5				ASA I BASEI		[]			
SUBSYSTE MDAC ID: ITEM:		FRCS 564 CONTRO	LLEI	R, REN	OTE	POWER	₹					
LEAD ANA	LYST:											
ASSESSME	NT:											
	CRITICAL FLIGH		RI	EDUNDA	NCY	SCREE	ens			CIL		
	HDW/FU		A		В		C					
NASA IOA	[/ / 3]	[]	[[]	[]		[]	*
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RECOMMEN	DATIONS:	(If	dif	feren	t fro	om NAS	SA)					
	, []	τ]	[]	[]	(AI	[D/D] ELI	e te)
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REMARKS: FORWARD CHANGE T	MANIFOLD O CIRCUI	ISOLA'	TION SEE	VALV ASSES	e #5 SMEN'	RE-Al I IDs	NALY FRC	ZED I	BY IC	OA D	UE 792	TO

ASSESSMI ASSESSMI NASA FMI	ENT	I		FRCS-	56	5							ASA D BASEI		[] *** *********************************
SUBSYSTE MDAC ID:				FRCS 565 CONTRO												
LEAD ANA	LY	ST	:													
ASSESSME	ENT	:														
	CR		ICAL:	ITY		RI	EDUND	AN	CY	SCRE	ENS	5			CIL	ver
	1			4C		A			В			С			TIE	A.
NASA IOA	[3	/ /2R]	[P]	[P]	[P]		[] *
COMPARE	Į	N	/N]	[N]	[N]	[N	1		[]
RECOMMEN	IDA!	TI	ONS:	(If	đ	ifi	feren	t	fro	om NA	SA)				
	[/]	[]	[]	[]	(AI	[D/D] ELETE)
* CIL RI	TE:	NT:	ION 1	RATIONA	/LI	Ξ:	(If	ap	pli	icabl						
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REMARKS: FORWARD	MA								- t.	and the state of t	. ** : : : : : :	0.000				

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SUBSYSTE MDAC ID:		FRCS 566 CONT		REMOTE	POWER			
LEAD ANA	LYST:						,	
ASSESSME	NT:							
		CALITY IGHT	RED	UNDANCY	SCREE	ıs	CII	
	HDW/	FUNC	A	В		С		
NASA IOA	[3 /	/] /2R]	[] [P]	[[P]	[] [P]	[] *]
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RECOMMEN	IDATION	NS: ()	[f diffe	rent fro	om NASA	A)		
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* CIL RE	TENTIC	ON RATIO	ONALE: (If appl:	icable		_	
]	ADEQUATE ENADEQUATE]
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ASSESSMENT DATE: ASSESSMENT ID: FRCS-567 NASA FMEA #: CURSUSMEM: FRCS-567 NASA FMEA #: NASA DATE BASELIN NE												[]	
SUBSYSTE MDAC ID:				FRCS 567 CONTRO	OLLEI	R, REI	MOTE	POWEI	R					
LEAD ANA	LY	ST	:											
ASSESSME	NT	:												
CRITICALITY REDUNDANCY SCREENS FLIGHT												CIL		
]			NC	A			-						
NASA IOA	[3	/3]	[]	[]	[]		[]	*
COMPARE	[N	/N]	[]	[]	[]		[]	
RECOMMEN	IDA'	TI	ons:	(If	dif	feren	t fr	om NAS	SA)					
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REMARKS: FORWARD CHANGE	MA	NI CT	FOLD RCUT	ISOLA'	TION SEE	VALV ASSES	E #5 SMEN	RE-Al	NAL FR	YZED BY CS 1100	' IC	OA DI -110	JΕ 79}	TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:			A DATA: SELINE [] NEW [X]									
MDAC ID:	FRCS 568 DIODE											
LEAD ANALYST:	D. HARTMAN											
ASSESSMENT:												
CRITICAL FLIGH	ITY REDUNDA	ANCY SCREENS	CIL ITEM									
HDW/FU	11111											
NASA [3 /1R IOA [3 /3] [P]] []	[F] [P] [] []	[X] * []									
COMPARE [/N] [N]	[N] [N]	[N]									
RECOMMENDATIONS:	(If different	: from NASA)										
[3 /3] []	[] []	[D] (ADD/DELETE)									
* CIL RETENTION	RATIONALE: (If a											
		ADEÇ INADEÇ	QUATE [] QUATE []									
REMARKS: NASA FMEA CONSID EFFECT.	REMARKS: NASA FMEA CONSIDERS MULTIPLE FAILURES. THIS FAILURE ALONE HAS NO											
AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE												

ISSUE REMAINS OPEN.

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-569 NASA FMEA #: 05-6KF-2255F-2											NA E	SA Basi	DA' ELI N	TA: NE EW	[x]							
SUBSYSTI MDAC ID: ITEM:					FR6																			
LEAD ANA	ALYS	ST	:		D.	HAI	RTI	(A)	1															
ASSESSMI	ENT	:																						
	CR	IT: F:	ICA LIG	LI	TY			RI	EDUI	ADN	N	CY	sc	REE	:NS	3					L EM			
	1	HDI	W/F	UN	C			A				В				C								
NASA IOA	[3	/1 /3	R]		[P]]	F]		[P]			[X]	*	
COMPARE	[/N]		[N]		[N]		[N]			[N]		
RECOMME	NDA:	rI(ons	:		(If	d:	ifi	fer	ent	. 1	fro	om	NAS	A))								
	Ţ	2	/1	R]		[P	1		[F]		[P]		(AI				TE)
* CIL R	etei	NT:	ION	F	tat:	ION	ALI	Ξ:	(I:	f a	PI	91 i	Lca	ble	e) Il	AI IAV	EQI EQI	UAT: UAT:	E Ē	[]		
REMARKS NASA FMI CAUSES I VALVE SI MOTOR DI LOSS OF ON ANOTI EXPEL PI	EA (EXC) LIGI AMA(JE) HER	es ht ge rs m	SIV LY WO ON ANI	THUI	MO' IEN LD LSS LD	TOR CLA LIKI OCIA	OI OSI ELY ATI LOS	PEI ES Y (ED SS	RAT IT CAU: MAI OF	ION , C SE NIF RE	:01 TI '01	(C) NST HE LD UNI	I'NC NAT AV NAC	TINC TLY LVE REI ICY	HI JOU I I C	IS JS REI IO	FA: POI PEA' CL	ILE WER FIN OSE Y P	D S TH G I , ()	SHO IAT ITS	ORI SEI USI OEC	PE F)	NS · ·	THE JETS
AT MEET: DISCUSSI DUE TO	ED.		IT	WA	S.	AGRI	EEI) I	JPO	N T	'HZ	TA	TH	E 1	SS	SUE	R	AIS	ED	ΑE	30V	Έ	WAS	3

ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-570	55C-1		NASA DATA BASELINE NEW	
MDAC ID:	FRCS 570 DIODE				
LEAD ANALYST:	D. HARTMA	N			
ASSESSMENT:					
CRITICAL: FLIGHT	ITY R	EDUNDA	NCY SCREI	ens	CIL ITEM
HDW/FU	-		В	С	
NASA [3 /1R IOA [3 /1R] [P]	[P] [P]	[P] [P]	[] *
COMPARE [/] []	[]	[]	[]
RECOMMENDATIONS:	(If dif	ferent	from NAS	SA)	
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* CIL RETENTION I	RATIONALE:	(If a	applicable	e) ADEQUATE INADEQUATE	[]

ASSESSME ASSESSME NASA FME	NT ID:	1/29/8 FRCS-5 05-6KF	71	2		N	ASA DAT BASELIN NE] K]		
SUBSYSTE MDAC ID:		FRCS 571 DIODE								* ,å\$	
LEAD ANA	LYST:	D. HAR	ETMA:	N							
ASSESSMENT:											
	CRITICAL FLIGH		R	EDUN	DANCY	SCRE	ENS		CII ITI		
	HDW/FU	INC	A		В	C	+ + + +				
NASA IOA	[3 /3 [3 /1F]	[[F]	[[P]	[[F	,]	[]] * K]	
COMPARE	[/N	1	[N]	ĺИ]	[N]	[]	1]	
RECOMMEN	DATIONS:	(If	dif	fere	nt fro	om NA	SA)				
	[/	1	(]	[1	[] ([ADD/I] DELETE)	
* CIL RE	TENTION	RATIONA	LE:	(If	appl	icabl		DEQUATE	: r	1	
DEWADEC.								DEQUATE		j	
REMARKS: IOA AGRE		NASA FM	ŒA.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-572 05-6KF-2255 -1		NASA DATA: BASELINE NEW				
MDAC ID:	FRCS 572 DIODE						
LEAD ANALYST:	D. HARTMAN						
ASSESSMENT:							
CRITICAL: FLIGH	ITY REDUNDA	NCY SCREENS	5	CIL			
HDW/FU	С	ITEM					
NASA [2 /1R IOA [3 /3] [P]] []	[F] [[] [P]	[X] * []			
COMPARE [N /N] [N]	ן וון [n]	[N]			
RECOMMENDATIONS:	(If different	from NASA)				
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* CIL RETENTION	RATIONALE: (If a			_			
1 2		I	ADEQUATE NADEQUATE				
REMARKS: NASA FMEA CONSID EFFECT.	ERS MULTIPLE FAI	LURES. TH	IS FAILURE	ALONE HAS NO			
AT MEETING WITH S DISCUSSED. IT WE DUE TO DIFFERENT ISSUE REMAINS OP:	AS AGREED UPON T INTERPRETATIONS	HAT THE IS	SUE RAISED	ABOVE WAS			

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	FRCS-57	NASA I BASEI	DATA: LINE [] NEW [X]		
SUBSYSTEM: MDAC ID: ITEM:	FRCS 573 DIODE			am dan m	nnen e e e e e e e e e e e e e e e e e
LEAD ANALYST:	D. HART	MAN			
ASSESSMENT:					
	CREENS	CIL ITEM			
	HT TUNC	A	В	С	IIEM
NASA [3 /3 IOA [3 /3	3] []	[]	[]	[] *
COMPARE [/) []	[]	[]	[]
RECOMMENDATIONS	s: (If d	lifferen	t from	NASA)	
[3 /2	2R] [P]	[P]	[P]	[] (ADD/DELETE)
* CIL RETENTION	I RATIONAL	E: (If	applica	able) ADEQUA INADEQUA	
POSITION. REDU	INDANCY PR	OVIDED.	LOSS	TE INDICATION OF ALL RED	ON OF THE VALVE JNDANCY MAY LEAD FECTING MISSION
	TITLE 10 ME				ACER ON 1/20/88

ASSESSMENT ASSESSMENT NASA FMEA	DATE: ID: #:	1/29/88 NASA DATA: FRCS-574 BASELINE [] 05-6KF-2255B-1 NEW [X]													
SUBSYSTEM: MDAC ID: ITEM:		FRCS 574 DIODE													
LEAD ANALYS	ST:	D. HAR	TM	AN	Ī										
ASSESSMENT	•														
CR	TICAL:	ITY r]	RE	DUNDA	NC	Y	SCRE	ENS	3		CII			
]	HDW/FUI	1	A			В			С						
NASA [IOA [NASA [3/2R] [P] [P] [P] [P] IOA [3/1R] [P] [P]										[]	*		
COMPARE [/N	1	[]	[]	[]	[]		
RECOMMENDA!	rions:	(If	di	ff	erent	Í	ro	m NAS	SA))					
[3 /1R]	[P]	[NA	\]	[P		[DD/[E)
* CIL RETE	NTION 1	RATIONA	LE	:	(If a	pr)1i	cable]		
THE GPC.	THIS DIODE FAILED OPEN CAUSES INABILITY TO OPEN THE VALVE WITH THE GPC. MANUAL REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET CG														
ISSUE NOT 1 1/20/88.	SSUE NOT RESOLVED AT THE MEETING WITH THE SUBSYSTEM MANAGER ON /20/88.														

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-575 NASA FMEA #: 05-6KF-2255B-2												-	ASA DA BASELI N		Ï	x]	
SUBSYST				FRCS 575 DIODE								* •						
LEAD AN	ALYS	T:	:	D. HAI	PT!	IAN	1											
ASSESSM	ENT:	:																
	CRITICALITY FLIGHT HDW/FUNC						EDUNI	OAN		SCRE	ENS					IL PEN	4	
	H	IDV	V/FUI	NC		A			В			С						
NASA IOA	[3	/3 /1R]	[F]	[P]]	P]		[x]	*
COMPARE	[/N	1	[N]	[N]	[N	1		[N]	
RECOMME	radn	PIC	ons:	(If	đ:	if	ferer	nt	fr	om NA	SA))						
	[/]	[]	[]	[]	(AI	[DD,	/DI	ELJ	ETE)
* CIL R		T	ION 1	RATIONA	\L	Ξ:	(If	ap	pl:	icabl	-		DEQUAT DEQUAT		[]	
REMARKS IOA AGR		W	CTH 1	NASA FI	1E	Α.		: -:		.TIF+.;+-1+						-		

ASSESSMENT ASSESSMENT NASA FMEA	576		-1				ASA D BASEL		[x]				
SUBSYSTEM: MDAC ID: ITEM:		FRCS 576 DIODE													
LEAD ANALYS	ST:	D. HA	RTM	AN											
ASSESSMENT	:														
CR		REDU	NDANG	CY	SCR	EENS			CIL ITEM						
1		A		В		С					•				
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COMPARE [/N	1	[и ј	[N]	[N]		[N]		
RECOMMENDA!	TIONS:	(If	di	ffer	ent i	fro	om N.	ASA)							
[3 /3	1	[]	[]	[]		[DD/			TE)	
* CIL RETE	NTION	RATION	ALE	: (1	f app) 1:	lcab	A.	DEQUA DEQUA]		
REMARKS: NASA FMEA (EFFECT.	CONSI	DERS MU	LTI	PLE	FAIL	JRI	ES.	THIS	FAII	URE	AI	10.	Œ	HAS	NO
AT MEETING DISCUSSED.	IT V	VAS AGR	EED	UPO	N TH	Υ	THE	ISSU	E RAI	S 22 SED	ΑE	708	Æ	WAS	₹.

ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-577 05-6KF-2255E-2		NASA DATA: BASELINE NEW	[x]
SUDSISTEM:	FRCS 577 DIODE	٠.	enger ()	
LEAD ANALYST:	D. HARTMAN			
ASSESSMENT:				
CRITICAL: FLIGHT		ANCY SCREENS		CIL ITEM
HDW/FUI	NC A	В	C	
NASA [3 /1R IOA [3 /3] [P]	[F] [[] [P]	[X] *
COMPARE [/N] [N]	[N] [и ј	[N]
RECOMMENDATIONS:	(If different	; from NASA)		
[2 /1R] [P]	[F] [[A] DD/DELETE)
* CIL RETENTION 1	RATIONALE: (If a	opplicable) IN	ADEQUATE ADEQUATE	
REMARKS: NASA FMEA CONSID	ERS MULTIPLE FAI	LURES. THI	S FAILED S	SHORT DIODE
CAUSES EXCESSIVE VALVE SLIGHTLY TO MOTOR DAMAGE WOUL LOSS OF JETS ON A ON ANOTHER MANIFO EXPEL PROPELLANTS	MOTOR OPERATION HEN CLOSES IT, C LD LIKELY CAUSE ASSOCIATED MANIF OLD. LOSS OF RE	(CONTINUOU CONSTANTLY R THE VALVE T FOLD. REDUN EDUNDANCY CA	S POWER THE EPEATING DO CLOSE, CONTROL DANCY PROV USES THE D	HAT OPENS THE ITSELF). CAUSING /IDED BY JETS
				• •

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-578 05-6KF-2255 -	·1	NASA DATA BASELINE NEW	
MDAC ID:	FRCS 578 DIODE			
LEAD ANALYST:	D. HARTMAN			
ASSESSMENT:				
CRITICAL FLIGH	ITY REDUN	IDANCY SCREE	ens	CIL ITEM
	NC A	В	C	± 2 200 5
NASA [2 /1R IOA [3 /3] [P]] []	[F] []	[P] []	[X] *
COMPARE [N /N] [N]	[N]	[N]	[N]
RECOMMENDATIONS:	(If differe	ent from NAS	SA)	
[3 /3] []	[]	[] (A	[D] DD/DELETE)
* CIL RETENTION	RATIONALE: (I1	f applicable	e) ADEQUATE INADEQUATE	[]
REMARKS: NASA FMEA CONTAI EFFECT.	NS MULTIPLE FA	AILURES. TH	HIS FAILURE	ALONE HAS NO
AT MEETING WITH DISCUSSED. IT W DUE TO DIFFERENT	AS AGREED UPOR	THAT THE	ISSUE RAISED	ABOVE WAS

ISSUE REMAINS OPEN.

ASSESSMENT DATE: 1/29/8 ASSESSMENT ID: FRCS-5 NASA FMEA #: 05-6KF SUBSYSTEM: FRCS						18 579 F-22	55 -	-2]	NASA BASE	DATA LINE NEW	[ंस इ.स.
SUBSYSTE MDAC ID:	11.1			FR6 579 DI6	9											
LEAD ANA	LY	ST	:	D.	HAF	AMT	N				1 1 12	1				
ASSESSME	NT	:														
	CR					R	EDUN	IDANC	Y	SCR	EENS			CII		
FLIGHT HDW/FUNC						A			В		(C).TI	
NASA IOA	[3 3	/3 /3]]]]]	[[]		[]	*
COMPARE	[/]		[]	[]	[]		[]	
RECOMMEN	IDA'	TI(ons:	ı	(If	dif	fere	ent f	ro	m N.	ASA)				-	
	[3	/2R]		[P]	[P]	[]	P]	(Al	[DD/E		TE)
* CIL RE	TE	NT:	ION 1	RAT:	IONA	LE:	(If	app	li	cab		ADEQU ADEQU	ATE ATE	[]	
REMARKS: THIS FAI POSITION TO FALSE OPERATION	LU LY	R F	EDUNI AILII	OANO	CY F	ROV VAL	IDEI). I CLOSE	OS	S O	IND F AL	CATI L RED	ON OI UNDAI	F TH	E V MAY	LEAD

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSME ASSESSME NASA FME	NT	I	D:	FRCS-	-580	268 -	1			ASA 1 BASE1	LINE	•		
SUBSYSTE MDAC ID: ITEM:				FRCS 580 DIODE	E									
LEAD ANA	LYS	ST	:	D. HA	RTM	AN								
ASSESSME	:TK	:												
											CII			
			NC L	7	4	E	3	c			1.1.1	LM		
NASA [3 /3] IOA [3 /3]					[]	[]	[[]		[]	*
COMPARE	[/	1	[1	ľ]	C	3		[3	
RECOMMEN	DA:	ric	ons:	(Íf	dif	fere	nt fr	om 1	NASA)					
	[3	/2R]	[]	?]	[F)]	[P]	(A	[DD/I) DELE	ETE)
* CIL RE	TEI				IALE:	(If	appl	icak	· A	DEQUA	ATE ATE	[]	
POSITION TO FALSE	INADEQUATE []													

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-58 NASA FMEA #: 05-6KF-					81	268	-2					SA DA' ASELI N		[]	
SUBSYSTEM MDAC ID: ITEM:	1 :		FRCS 581 DIO														
LEAD ANAI	LYST	:	D. 1	HAR	TM	\N											
ASSESSMEN	T:																
C		ICAL:			I	REDU	JNDAN	ICY	SCRE	ENS	5			C]	IL CEM	Æ.	
• .		LIGH: W/FUI			2	A		В			C,				, alex	1	
NASA IOA	[3 [3	/1R /3]		[]	?]	[P]	[P]		[]	*
COMPARE	[/N]		[]	1]	[N]	[N]		[N]	
RECOMMEN	DATI	ons:	(:	Ιf	di	ffei	rent	fr	om NA	SA))						
	[/]		[]	[•]	[3	(AI	[/D	/DF] ELE	TE)
* CIL RE	rent:	ION I	RATI(ONA	LE:	: (]	If ar	p]	icabl			EQUAT EQUAT]]	
REMARKS:	rc W	ו אידי	NASA	FM	EA.	_											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-582	58 -1]	ASA DATA: BASELINE NEW]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 582 DIODE					
LEAD ANALYST:	D. HARTMAN	1				
ASSESSMENT:						
CRITICAL: FLIGH	ITY RI	EDUNDANCY	SCREENS		CIL	ī
HDW/FU		В	С		IIGA	•
NASA [3 /3 IOA [3 /3] [] [] []	[] *]
COMPARE [/] [] [] []	[Ì
RECOMMENDATIONS:	(If diff	ferent fro	om NASA)			
[3 /2R] [P] [P] [P		[DD/DE] CLETE)
* CIL RETENTION	RATIONALE:	(If appli	· A	DEQUATE DEQUATE	[]
REMARKS: THIS FAILURE MAY POSITION. REDUNT TO FALSELY FAILURE OPERATIONS	DANCY PROVI	IDED. LOS	RATE INDI	CATION O	F THE	VALVE

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSMEI ASSESSMEI NASA FME	I TN	D:	1/29/8 FRCS-9 05-6K	583	68 - 2	2			DATA SELINE NEW]
SUBSYSTEMDAC ID:	м:		FRCS 583 DIODE							-	
LEAD ANA	LYSI	?:	D. HAI	RTMA	N						
ASSESSMEI	NT:										
(F	ICAL LIGH	r				SCRE			CIL	
	HL	W/FU	NC	A		В		С			
NASA IOA	[3	/1R /3]	[P]	[P]	[P] []		[[] *
COMPARE	[/N]	[N]	[1]	[N]		[N]
RECOMMEN	DATI	ONS:	(If	dif	fere	nt fr	om NA	SA)			
	[/]	[]	[]	[]	(A)	[DD/D] ELETE
* CIL RE	rent	I NOI	RATION	ALE:	(If	appl	icabl		UATE UATE	•]
REMARKS:	re w	י עידי	MACA ET	ATA .							

ASSESSMENT ASSESSMENT NASA FMEA			55A-1				ASA DATA BASELINE NEW]		
SUBSYSTEM: MDAC ID: ITEM:		FRCS 584 DIODE									
LEAD ANALY	ST:	D. HA	RTMA	N.							
ASSESSMENT	:										
CR	ITICAL FLIGH	REDUNDANCY			SCRE	ENS		CIL			
;	NC	A		В	ŀ	C	:	111	rı		
NASA [IOA []	[]]]	[]	[]	*	
COMPARE [/]	[]	[]	[]	[]	
RECOMMENDA	TIONS:	(If	dif	feren	t fr	om NA	SA)				
1	/	1	(]	[]	[] (A	[.DD/D		ETE)
* CIL RETE	NTION	RATION	ALE:	(If	appl	icabl				,	
								DEQUATE DEQUATE	[]	
LOSE 1 OF BY SECOND COUPLED WI	EMARKS: OSE 1 OF 2 GPC COMMANDS TO CLOSE THE VALVE. REDUNDANCY PROVIDED BY SECOND GPC COMMAND AND MANUAL CLOSE COMMAND. LOSS OF THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY PREVENT SOLATION OF A THRUSTER LEAK.										

SUBSYSTEM MANAGER STATED THAT THE GPC IS NOT USED TO ISOLATE A LEAK BECAUSE THE TIME TO EFFECT CAN BE UP TO 24 HOURS (SOFTWARE HAS TO BE MANUALLY LOADED). IOA WITHDRAWS THEIR ISSUE BASED ON THIS RATIONALE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-585	2	BASELINE NEW	
MDAC ID:	FRCS 585 DIODE			
LEAD ANALYST:	D. HARTMAN			
ASSESSMENT:				
CRITICALI FLIGHT		DANCY SCREE	ns	CIL ITEM
HDW/FUN		В	С	11111
NASA [3 /3 IOA [3 /1R] [[P]	[] [P]	[x] *
COMPARE [/N	ן וו א	[и]	[N]	[N]
RECOMMENDATIONS:	(If differe	nt from NAS	A)	
[/] []	[]	[] (A)	[] DD/DELETE)
* CIL RETENTION B	RATIONALE: (If	applicable	ADEQUATE	[]
REMARKS: IOA AGREES WITH N	NASA FMEA.	eg harasan sa wasan s	7 - m-7	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-586 05-6KF-22	55 A-1		NASA DATA: BASELINE NEW]
SUBSYSTEM: MDAC ID:	FRCS					
LEAD ANALYST:	D. HARTMA	N				
ASSESSMENT:						
FLIGH'					CIL	
HDW/FU	NC A	В		С		
NASA [3 /3 IOA [3 /3] [] [] [[] *
COMPARE [/] [] [] [[]	[.]
RECOMMENDATIONS:	(If dif	ferent fr	om NASA	A)		
[, ,/] [] []	[] (A)	[DD/DI] CLETE)
* CIL RETENTION	RATIONALE:	(If appl) ADEQUATE INADEQUATE	[]
REMARKS: LOSE 1 OF 2 GPC BY SECOND GPC CO COUPLED WITH THE ISOLATION OF A T	MMAND AND LOSS OF A	MANUAL CL LL HARDWA	HE VALV	VE. REDUND. MMAND. LOS	ANCY S OF	PROVIDED THIS,
SUBSYSTEM MANAGE LEAK BECAUSE THE HAS TO BE MANUAL	TIME TO E	FFECT CAN	BE UP	TO 24 HOUR	s (sc	FTWARE

THIS RATIONALE.

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-587 NASA FMEA #: 05-6KF-2255A-					-2			ASA DATA BASELINI NEV]		
SUBSYSTE MDAC ID:			FRCS 587 DIODE									
LEAD ANA	LYS'	T:	D. HA	RTM	AN							-
ASSESSME	ENT:											
		TICAL:	r			NDANCY				CIL		
	H	DW/FUI	NC		A	В	,	С		-		
NASA IOA	[3 /3 3 /1R]	[] F]	[[P]	[[P]	[x] *	
COMPARE	[/N]	[и]	[N]	[14] ·	[N	.]	
RECOMMEN	DAT:	ions:	(If	di	ffer	ent fr	om N	NASA)	ত প্ৰতিষ্ঠ	For Section	, a, -	
	[/]	[]	[]	[] (2	[ADD/D] ELETE	Ξ)
* CIL RE			- 			f appl	icab	AD	EQUATE EQUATE]	
TAN NOWE		*****	WOW LI		•							

ASSESSMENT ASSESSMENT NASA FMEA	ID:	FRCS-5	1/29/88 FRCS-588 05-6KF-2255D-1]	NASA DA BASEL		[x]	
SUBSYSTEM: MDAC ID: ITEM:		FRCS 588 DIODE											
LEAD ANALY	ST:	D. HAR	(AMT	4									
ASSESSMENT	? :												
CF	RITICAL FLIGH	ITY T	R	EDUNDA	ANCY	SCRE	ens			CI	L EM		
	HDW/FU		A		В		(С					
NASA [] AOI	3 /1R 3 /3]	[P]	[P]]	[]	P]		[]	*
COMPARE [/N]	[N]	[N]	[]	N]		[]	
RECOMMENDA	ATIONS:	(If	dif	ferent	fr:	om NAS	SA)						
ι	/]	[]	[]	[]	(AI		DE		TE)
* CIL RETE REMARKS: IOA AGREES				(If a	appl	icable		ADEQUA ADEQUA	TE TE	[]	

ASSESSME ASSESSME NASA FME	NT	II		FI	/29/ RCS- 5-6K	589		55D-	-2							DATA LINE NEW	[]	
SUBSYSTE MDAC ID: ITEM:	м:			58	RCS 19 CODE															
LEAD ANA	LYS	ST	:	D.	HA	RTI	MAI	N												
ASSESSME	NT	:																		
	CR.		ICAL		?		R	EDUI	NDA	NC.	Y	SCR	EENS	5				[L [E]		
	I		LIGH N/FU				A				В			С			1.	LEF	1	
NASA IOA	[3	/3 /1R]		[F]		[P]	[P]		[x]	*
COMPARE	[/N]		[N	3		[]	N]	[N]		[N]	
RECOMMEN	DA?	ric	ons:		(If	d	if	fere	ent	f	rc	m N	ASA)						
	(/ -]		[]		[.]	[]	(Al	[OD/	/DI] ELE	TE)
* CIL RE	TEI	N T I	ION :	RAT	NOI	ALI	Е:	(II	f a	pp.	li	.cab	-			ATE ATE	[]	
REMARKS:	PC	1 .77	rmu i	NY X C	ים גי	urter:	.								-		_		-	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/29/88 FRCS-590 05-6KF-2		NASA DATA BASELINE NEW		
MDAC ID:	FRCS 590 DIODE				
LEAD ANALYST:	D. HARTI	MAN			
ASSESSMENT:					
CRITICALI FLIGHT		REDUNDAN	NCY SCREEN	S	CIL ITEM
HDW/FUN		A	В	C	
NASA [3 /1R IOA [3 /3] [P]	[F] [P]	[X] * []
COMPARE [/N] . [ן א	[и]	n j	[N]
RECOMMENDATIONS:	(If d	ifferent	from NASA	')	
[3 /3] [] [[] [] (A	[D] DD/DELETE)
* CIL RETENTION F	RATIONAL	E: (If ag	•	ADEQUATE	[]
REMARKS: NASA FMEA CONTAIN EFFECT.	ns multi	PLE FAIL	JRES. THI	S FAILURE	ALONE HAS NO
AT MEETING WITH S DISCUSSED. IT WA DUE TO DIFFERENT	AS AGREE	D UPON TH	HAT THE IS	SUE RAISED	

ISSUE REMAINS OPEN.

ASSESSMENT DATE:	1/29/88		NASA DATA	•
ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-591 05-6KF-22551	F-2	BASELINE NEW	[x]
MDAC ID:	FRCS 591 DIODE			
LEAD ANALYST:	D. HARTMAN		æ	
ASSESSMENT:				
FLIGH	ITY REDU T			CIL ITEM
	NC A	В	C	
NASA [3 /1R IOA [3 /3] [P]] []	[F] []	[P] []	[X] *
COMPARE [/N] [N]	[и]	[и]	[N]
RECOMMENDATIONS:	(If differ	rent from NA	SA)	
[2 /1R] [P]	[F]	[P] (A	[A] DD/DELETE)
* CIL RETENTION	RATIONALE: ([f applicabl	e) ADEQUATE INADEQUATE	
REMARKS: NASA FMEA CONSID CAUSES EXCESSIVE VALVE SLIGHTLY T MOTOR DAMAGE WOU LOSS OF JETS ON ON ANOTHER MANIF EXPEL PROPELLANT	MOTOR OPERATHEN CLOSES IT LD LIKELY CAU ASSOCIATED MADE OLD. LOSS OF TO MEET CG	TION (CONTING), CONSTANTLUSE THE VALVANIFOLD. REFEREDUNDANCY CONSTRAINTS	THIS FAILED TOUS POWER TO Y REPEATING TO CLOSE, DUNDANCY PROCEED THE	SHORT DIODE HAT OPENS THE ITSELF). CAUSING VIDED BY JETS INABILITY TO
AT MEETING WITH DISCUSSED. IT W DUE TO DIFFERENT	AS AGREED UPO	ON THAT THE	ISSUE RAISED	ABOVE WAS

ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	NT	II		FR	./29/88 RCS-592 95-6KF-2255C-1					NASA DATA: BASELINE [] NEW [X]										
SUBSYSTE MDAC ID: ITEM:	M:			FR 59 DI															5.5	
LEAD ANA	LYS	ST	:	D.	HAI	?TI	IAN	1												
ASSESSME	NT:	:																		
	CR:		ICAL				RI	EDU	NDA	NC	Y	sc	REEN	S				CII		
	1		LIGH W/FU				A				В			С				111	214	
NASA IOA	[3 3	/1R /1R]		[P P]		[P P]	[[P P]			[[]	*
COMPARE	ξ		/]		[]		[J	[]			[]	
RECOMMEN	DA!	ri	ons:		(If	đ.	if:	fer	ent	: 1	r	m	NASA)						
]		/]		[]		[]	[]	(AD) DEL	ETE)
* CIL RE	TE	NT:	ION	RAI	'ION	AL.	E:	(I	f a	pŗ	1:	ica				UATE UATE]]	
REMARKS:	RE	NC:	ES.										. ** ; * *	-					14 .	- 17

ASSESSMENT ASSESSMENT NASA FMEA	ID:	1/29/88 FRCS-59: 05-6KF-2			NASA DATA: BASELINE [] NEW [X]					
SUBSYSTEM: MDAC ID: ITEM:		FRCS 593 DIODE				70.007	י און און און די די די די די די די די די די די די די			
LEAD ANALY	ST:	D. HARTI	MAN							
ASSESSMENT	•									
CR	ITICAL: FLIGHT		REDUND	ANCY	SCREEN	s	CIL ITEM			
]	HDW/FUI	1C	A	В		C				
NASA [IOA [3 /3 3 /1R] [F]	[[P] [P]	[x] *			
COMPARE [/N] [N]	[N] [n j	[и]			
RECOMMENDA'	TIONS:	(If di	ifferen	t fro	m NASA)				
[/] [j	ζ.,] [[] (A	[] DD/DELETE)			
* CIL RETE	NTION I	RATIONALI	E: (If	appli		ADEQUATE NADEQUATE				
REMARKS:	WITH R	NASA FMEA	١.		1	NADEGOVIE	í J			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-594 05-6KF-22	:55 - 1	NASA DATA BASELINE NEW					
SUBSYSTEM: MDAC ID:	FRCS 594 DIODE							
LEAD ANALYST:	D. HARTMA	AN .	- **** () () <u>- 4 ()</u>	. The second second second				
ASSESSMENT:								
CRITICAL: FLIGH		REDUNDANCY	SCREENS	CIL ITEM				
	NC A	В	C	ITEM				
NASA [2 /1R IOA [3 /3] [P)] [P]] []	[X] *				
COMPARE [N /N] [N	гј [и] [N]	[N]				
RECOMMENDATIONS:	(If dif	ferent fro	om NASA)					
[3 /3] [] [[D] DD/DELETE)				
* CIL RETENTION I		,	ADEQUATE INADEQUATE	į				
NASA FMEA CONTAIN EFFECT.	NS MULTIPL	E FAILURES	5. THIS FAILURE	ALONE HAS NO				
AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE								

ISSUE REMAINS OPEN.

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	: 1/29/88 FRCS-59 05-6KF-	3 95 -2255 - 2			ATA: INE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 595 DIODE				
LEAD ANALYST:	D. HART	rman			
ASSESSMENT:					
CRITICA FLIG	LITY	REDUNDA	NCY SCI	REENS	CIL ITEM
-	UNC	A	В	С	1154
NASA [3 /3 IOA [3 /3]		[]	[]	[] *
COMPARE [/) ([]	[]	[]	[]
RECOMMENDATIONS	: (If d	lifferent	from 1	NASA)	
[3 /2	R]	[P]	[P]	[P]	[] (ADD/DELETE)
* CIL RETENTION	RATIONAL	LE: (If a	applical		
· · · · · · · · · · · · · · · · · · ·				ADEQUA' INADEQUA'	re [] re []
REMARKS: THIS FAILURE MA POSITION. REDU TO FALSELY FAIL OPERATIONS.	NDANCY PI ING THE V	ROVIDED. VALVE CLO	LOSS (DSED, PO	E INDICATION OF ALL REDUI OSSIBLY EFF	N OF THE VALVE
TESTIF NOT DESOI	מידע איז איז איז	PROTING WI	TH SIIR	SVSTEM MANA	GER ON 1/20/88.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:				BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 596 DIODE				
LEAD ANALYST:	D. HARTM	AN			
ASSESSMENT:					
CRITICAL FLIGH		REDUNDANCY	SCREENS		CIL ITEM
HDW/FU		A E	1	С	
NASA [3 /2R IOA [3 /1R] []	P] [F P] [F		P] P]	[] *
COMPARE [/N) [] [] []	[]
RECOMMENDATIONS:	(If di	fferent fr	om NASA)	n di terri	en en en en en en en en en en en en en e
[3 /1R] []	P] [N	(A)	P]	[] DD/DELETE)
* CIL RETENTION	RATIONALE	: (If appl		ADEQUATE ADEQUATE	[]
REMARKS: THIS DIODE FAILE THE GPC. MANUAL CAUSES LOSS OF JULIMITS.	REDUNDAN	CY PROVIDE	LITY TO	OPEN THE Y	VALVE WITH EDUNDANCY
ISSUE NOT RESOLV	ED AT THE	MEETING W	ITH THE	SUBSYSTEM	MANAGER O

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	FRCS-					NASA DAT BASELIN NI		
SUBSYSTEM: MDAC ID: ITEM:	FRCS 597 DIODE							
LEAD ANALYST:	D. HA	RTMAI	1					
ASSESSMENT:								
	LITY	RI	EDUNI	DANCY	SCREE	NS	CII	
FLIC HDW/I	UNC	A		В		С	115	.M
NASA [3 /3 IOA [3 /3	R]	[[F]	[[P]	[] [P]) K]	; ; * ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;
COMPARE [/1	1]	[N]	[N]	[и]	[N	1]
RECOMMENDATIONS	: (If	dif	fere	nt fro	om NAS	A)		
[/]	[]	[]	[]] ELETE)
* CIL RETENTION REMARKS:	RATION	ALE:	(If	appli	cable) ADEQUATI INADEQUATI	e [e []
IOA AGREES WITH	NASA F	MEA.		. ==				

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-598	55E - 1		SA DATA: ASELINE [NEW [x]			
SUBSYSTEM: MDAC ID: ITEM:	FRCS 598 DIODE							
LEAD ANALYST:	D. HARTMA	. HARTMAN						
ASSESSMENT:								
	ITY R	EDUNDANCY	SCREENS	C:	IL TEM			
FLIGH HDW/FU		В	С	.	IEM			
NASA [3 /1R IOA [3 /3] [P] [F] [P] [x] *			
COMPARE [/N] [N] [N] [N]) [N]			
RECOMMENDATIONS:	(If dif	ferent fro	om NASA)					
[3 /3] [] [] [] [(ADD)	D] /DELETE)			
* CIL RETENTION	RATIONALE:	(If appli	AD	EQUATE [EQUATE []			
REMARKS: NASA FMEA CONSID EFFECT.	ERS MULTIP	LE FAILURE	Es. THIS	FAILURE A	LONE HAS NO			
AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE								

ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-599 05-6KF-2255E-2	NASA DATA BASELINE NEW	: [x]				
MDAC ID:	FRCS 599 DIODE	v ·					
LEAD ANALYST:	D. HARTMAN						
ASSESSMENT:							
CRITICAL FLIGH	ITY REDUNDAN	CY SCREENS	CIL ITEM				
	NC A	ВС					
NAŠA [3 /1R IOA [3 /3	[P] [E	F] [P]	[X] * []				
COMPARE [/N) [N] [и] [и]	[N]				
RECOMMENDATIONS:	(If different	from NASA)					
[2 /1R	[P] [F] [P] (A	[A] DD/DELETE)				
* CIL RETENTION	RATIONALE: (If app	plicable) ADEQUATE INADEQUATE					
REMARKS: NASA FMEA CONSIDERS MULTIPLE FAILURES. THIS FAILED SHORT DIODE CAUSES EXCESSIVE MOTOR OPERATION (CONTINUOUS POWER THAT OPENS THE VALVE SLIGHTLY THEN CLOSES IT, CONSTANTLY REPEATING ITSELF). MOTOR DAMAGE WOULD LIKELY CAUSE THE VALVE TO CLOSE, CAUSING LOSS OF JETS ON ASSOCIATED MANIFOLD. REDUNDANCY PROVIDED BY JETS ON ANOTHER MANIFOLD. LOSS OF REDUNDANCY CAUSES THE INABILITY TO							
EXPEL PROPELLANT	S TO MEET CG CONS						
		AT THE ISSUE RAISED OF NSTS 22206. THE					

ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID:	1/29/88 FRCS-600		NASA I BASE:	LINE []
NASA FMEA #:	FRCS-600 05-6KF-225	5 -1		NEW [X]
SUBSYSTEM: MDAC ID:	FRCS 600 DIODE			
LEAD ANALYST:	D. HARTMAN	Ī		e de la Caración de l
ASSESSMENT:				
CRITICALI		DUNDANCY	SCREENS	CIL ITEM
FLIGHT HDW/FUN		В	C	1 1 DM
NASA [2 /1R IOA [3 /3] [F] [P]] []	[X] *
COMPARE [N /N] [и] [N] [N]	[N]
RECOMMENDATIONS:	(If diff	erent fr	om NASA)	· · · · · · · · · · · · · · · · · · ·
[3 /3] [] [] []	[D] (ADD/DELETE)
* CIL RETENTION F	RATIONALE:	(If appl	icable) ADEQU INADEQU	• •
REMARKS: NASA FMEA CONTAIN EFFECT.	S MULTIPLE	FAILURE	S. THIS FAIL	URE ALONE HAS NO
AT MEETING WITH S	SUBSYSTEM M	ANAGER O		TS 22206 WAS

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSMENT ASSESSMENT NASA FMEA SUBSYSTEM:	DATE: ID: #:				ASA DATA BASELINE NEW]				
SUBSYSTEM: MDAC ID: ITEM:		FRCS 601 DIODE									
LEAD ANALY	ST:	D. HAF	RTMA	N							
ASSESSMENT	:										
CR	ITICAL: FLIGH		R	EDUND	ANCY	SCRE	ENS		CIL		
1											
NASA [IOA [3 /3 3 /3]	[]	[]]]	[]	*
COMPARE [/]	[]	C]	[]	[]	
RECOMMENDA	TIONS:	(If	dif:	feren	t fro	om NAS	SA)				
C	3 /2R]	[P]	[P]	[P		[DD/D:		TE)
* CIL RETE	NTION 1	RATIONA	LE:	(If	appli	icable	ΑI	DEQUATE	Ĺ	ļ	
REMARKS: THIS FAILU POSITION. TO FALSELY OPERATIONS	REDUNI FAILII	DANCY I NG THE	ROV: VAL	IDED. VE CL	LOS DSED,	S OF POSS	INDIC ALL SIBL	REDUNDA	F THI NCY I ING I	E V MAY MIS	LEAD SION
ISSUE NOT	RESOLVI	ED AT M	EET:	ING W	ITH S	SUBSYS	STEM	MANAGER		Ĭ.	

ASSESSME ASSESSME NASA FME	ΝŤ	ID:	1	1/29/8 FRCS-6 05-6KI	502	58 - 1				ASA DATA BASELINE NEW		[***
SUBSYSTE MDAC ID: ITEM:	м:		(FRCS 502 DIODE									÷
LEAD ANA	LYS	T:	I	D. HAI	RTMAI	4		*: * · ·	£	-			
ASSESSME	NT:												
			ALIT	ΓY	RI	EDUNDA	NCA	SCRE	ens		CII		
			FUN	C	A		В		C		111	7141	
NASA IOA	[3 / 3 /	3]	[.]	[]	[]	[]	*
COMPARE	[/]	[]	[]	[]	[]	
RECOMMEN	DAT	ION	s:	(If	dif	ferent	fr	om NAS	SA)				
	[3 /	2R]]	[P]	[P]	[P		[.DD/I) ELI	ETE)
* CIL RE	TEN	TIO	N R	ATION?	ALE:	(If a	appl	icable			-	,	
										DEQUATE DEQUATE	[]	
REMARKS: THIS FAI POSITION TO FALSE OPERATIO	LY	RED	UND	ANCY I	PROV	IDED.	LO	SS OF	ALL	REDUNDA	NCY	MAY	LEAD

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

	1/29/88 FRCS-603 05-6KF-22	:68 - 2	:	NASA DAT BASELIN NE		• • •
MDAC ID:	FRCS 603 DIODE					
LEAD ANALYST:	D. HARTMA	N				
ASSESSMENT:						
CRITICAL		REDUNE	ANCY SCR	EENS	CIL ITEM	
FLIGH HDW/FU			В	C	lich	
NASA [3 /1R IOA [3 /3	[])	[P]	[P] []	[]*	
COMPARE [/N] []	1]	[N]	[и]	[N]	
RECOMMENDATIONS:	(If di	feren	t from N	ASA)		
[/) []	[,]	[] ([] ADD/DELETE)
* CIL RETENTION	RATIONALE:	(If	applicab	le) ADEQUATE INADEQUATE		
REMARKS:	MACA EMEA				, ,	

ASSESSMENT DAT ASSESSMENT ID: NASA FMEA #:	FRCS-6 05-6K	88 604 F-22			ASA [BASE]		[;]			
SUBSYSTEM: MDAC ID: ITEM:	FRCS 604 DIODE									•	
LEAD ANALYST:	D. HA	RT MA	N								
ASSESSMENT:											
CRITIC		R	EDUNE	ANCY	SCR	EENS			CII		
	ent Func	A		E		С		- 577	TIL		
NASA [3 / IOA [3 /	3] 3]]]	[]	[]		[] *	
COMPARE [/	1	[]	[]	Ĺ]		[]	
RECOMMENDATION	S: (If	dif	ferer	it fr	om N	ASA)			-		
,,,,,,,[,, 3 /	2R]	[P	1	[F]	[P]	(AI	[DD/I] DELETE)	
* CIL RETENTIO	N RATION	ALE:	(If	appl	icab		DEQU <i>I</i>	ישיחי	r	1	
· · · · · · · · · · · · · · · · · · ·	172						DEQUA		[]	
REMARKS: THIS FAILURE M POSITION. RED TO FALSELY FAI OPERATIONS.	JNDANCY	PROV	IDED.	LC	ss o	F ALL	REDU	INDAI	1CY	MAY LEA	AD.

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSME ASSESSME NASA FME	NT I	D:	FRCS-	605	268 -	-2			SA DATA SELINE NEW	[;] ;]
SUBSYSTE MDAC ID:			FRCS 605 DIODE								
LEAD ANA	LYSI	:	D. HA	RTM	AN						
ASSESSME	NT:										
	I	TICAL FLIGHT]		DANCY B	SCR	EENS C		CII	
NASA IOA	[3	3 /1R 3 /3]	[P]	[P]	[P] []		[] *]
COMPARE	[/N]	[N]	[И	3	[N]		[]	1]
RECOMMEN	IDAT]	cons:	(If	di	ffere	ent fro	om N	ASA)			
	[/]	[]	C]	[]	(A	[DD/I] DELETE)
* CIL RE	-					appl:	icab	le) ADI INADI	EQUATE EQUATE	[]
IOA AGRE	EES V	WITH !	NASA F	MEA	•						

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ASSESSMENT ASSESSMENT NASA FMEA #	TD.	PDCC-	SO S	55 A- 1				ASA DATA BASELINE NEW]	
SUBSYSTEM: MDAC ID: ITEM:		FRCS 606 DIODE						-	-		
LEAD ANALYS	T:	D. HAI	RTMA	N							
ASSESSMENT:											
	TICAL	ITY r	R	EDUND	ANCY	SCREI	ens		CIL		
		NC	A		В		С				
NASA [IOA [3 /3 3 /3]] []	[]	[]	[]	*
COMPARE [/]	[]	[]	[]	[]	
RECOMMENDAT	cions:	(If	dif	feren	t fr	om NAS	5A)				
	/]	[]	[]	[] (A	[.DD/D		TE)
* CIL RETEN	TION :	RATION	ALE:	(If	appl	icable			_	_	
							INA	DEQUATE DEQUATE	[]	
REMARKS: LOSE 1 OF 2 BY SECOND G COUPLED WIT	PC CO	MMAND LOSS	AND OF A	MANUA LL HA	L CL	OSE CO	IAMMC	ND. LOS	S OF	TH	IS,
SUBSYSTEM M LEAK BECAUS HAS TO BE M THIS RATION	SE THE	TIME '	TO E	FFECT	CAN	BE U	OT 9	24 HOUF	S (S	OFT	WARE

ASSESSME ASSESSME NASA FME	NT I	D:	1/29/ FRCS- 05-6K	607	55A-	-2			ATA: INE [] IEW [X]
SUBSYSTE MDAC ID: ITEM:			FRCS 607 DIODE	:				146, <u>\$</u> 12	
LEAD ANA	LYSI	?:	D. HA	RTMA	N				
ASSESSME	NT:								
	F	LIGH						REENS	CIL ITEM
	HL	W/FU	NC	A		1	3	C LEARLE	
NASA IOA	[3	/3 /1R]	[[F]	[]] P]	[] [P]	[x] *
COMPARE	[/N]	[N]	[]	4]	[N]	[и]
RECOMMEN	DATI	ons:	(If	dif	fere	ent fi	com N	ASA)	el I i d'Attione e
	[/]	[3	Ţ.]	[]	[] (ADD/DELETE)
* CIL RE					(If	appl	licab	le) ADEQUAT INADEQUAT	
IOA AGRE	ES W	ITH I	NASA F	MEA.					

ASSESSMI ASSESSMI NASA FMI	ENT ENT EA	D. I! #:	ATE: D:	1/: FR: 05:	29/8 CS-6 -6K	88 608 F-22	255A-	1	NASA DATA: BASELINE [] NEW [X]						
SUBSYSTEMDAC ID:	EM:				CS B										
LEAD ANA	ALYS	ST	:	D.	HAI	RTM	AN							-	
ASSESSMI	ENT:	:													
		F	ICAI LIGH W/FU	IT		1		DANCY B		REENS			CIL		
NASA IOA	[3	/3 /3]		[]	[]	[]		[] *	ŧ
COMPARE	[/	}		[]	[]	ſ]		[]	
RECOMMEN	'ADA	ΓI	ONS:		(If	dii	ffere	nt fr	om 1	NASA)					
	[/	1		[]	C]	[]	(A l	[DD/D		E)
* CIL RI		VT:	ION	RAT	ION	ALE:	: (If	appl	ical	P		ATE ATE]	
REMARKS: LOSE 1 C BY SECON COUPLED ISOLATIC	OF 2 ND (WIT	SP(CH	C CC	MMAI	ND Z	AND OF 1	MANU ALL H	AL CL	OSE	COMMA	ND.	LOSS	S OF	THI	S,
SUBSYSTI															

SUBSYSTEM MANAGER STATED THAT THE GPC IS NOT USED TO ISOLATE A LEAK BECAUSE THE TIME TO EFFECT CAN BE UP TO 24 HOURS (SOFTWARE HAS TO BE MANUALLY LOADED). IOA WITHDRAWS THEIR ISSUE BASED ON THIS RATIONALE.

	1/29/88 FRCS-609 05-6KF-22	55 A- 2		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 609 DIODE				
LEAD ANALYST:	D. HARTMA	N		·	million in the second of the s
ASSESSMENT:					
CRITICAL FLIGH		EDUNDA	NCY SCREE	ens	CIL ITEM
HDW/FU	NC A		В	С	
NASA [3 /3 IOA [3 /1R] [F	, .]	[] [P]	[] [P]	[x] *
COMPARE [/N] [N]	[N]	[N]	[и]
RECOMMENDATIONS:	(If dif	ferent	from NAS	SA)	
[/) (]	[]	[] (A)	[] DD/DELETE)
* CIL RETENTION	RATIONALE:	(If a	pplicable	ADEQUATE INADEQUATE	[]
REMARKS: IOA AGREES WITH	NASA FMEA.			TWODIACUIT	ı J

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-610 05-6KF-22!	55D-1		NASA DATA: BASELINE NEW	-]
	FRCS 610					
ITEM:	DIODE					
LEAD ANALYST:	D. HARTMAI	N				
ASSESSMENT:						
CRITICAL: FLIGH		EDUNDANCY	SCREENS		CIL	[
HDW/FU	NC A	В		C	•	
NASA [3 /1R IOA [3 /3] [P] [P] [P]	[] *
COMPARE [/N] [N) [N] [ן א	[]
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)			
[/] [] [] [] (A)	[DD/DE] ELETE)
* CIL RETENTION	RATIONALE:	(If appl		ADEQUATE ADEQUATE	[]
REMARKS:	NACA EMEA		-	-	•	-

ASSESSME ASSESSME NASA FME	TK	I		F	/29/8 RCS-6 5-6KI	51		55D-	-2						DATA ELINE NEV		x]	
SUBSYSTE MDAC ID: ITEM:				6	RCS 11 IODE								-						
LEAD ANA	LYS	ST	:	D	. HAI	RTI	MAI	N											
ASSESSME	NT:	:																	
	CR		ICAL LIGH		Y.		R	EDUI	MDAN	ICY	SC	REENS	5				IL PEN		
	I		W/FU				A			В			С			-		•	
NASA IOA	[3 3	/3 /1R]		[F]	[P]]	P]		[x]	*
COMPARE	[/N]		[N]	(N]	[N]		[N]	
RECOMMEN	IDA'	ri	ONS:		(If	d :	if	fere	ent	fr	om 1	NASA))						
	[/]		[]	(]]	(2	/DD/	/DI] ELE	TE)
* CIL RE								(Ii	f ap	pl	ica				JATE JATE]	
IOA AGRE	ES	W:	ITH	NAS	SA FI	Æ.	Α.												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-612 05-6KF-2255	NASA DATA BASELINE NEW									
SUBSYSTEM: MDAC ID:	FRCS 612 DIODE										
LEAD ANALYST:	D. HARTMAN										
ASSESSMENT:											
CRITICAL FLIGH	CIL ITEM										
		В	c	112							
NASA [3 /1R IOA [3 /3] [P]] [F]] []	[P] []	[X] *							
COMPARE [/N] [N]] [N]	[N]	[N]							
RECOMMENDATIONS:	(If diffe	erent from 1	NASA)								
[3 /3] [] []	[] (A	[D] DD/DELETE)							
REMARKS:	* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []										
AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS											
DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE											

ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-613 05-6KF-2255F-2	NASA DATA BASELINE NEW	: [
SUBSYSTEM: MDAC ID:	FRCS		
LEAD ANALYST:	D. HARTMAN		
ASSESSMENT:			
PT.TCH	ITY REDUNDANCY		CIL ITEM
HDW/FU	NC A B	c	11111
NASA [3 /1R IOA [3 /3] [P] [F] [P]] []	[X] *
COMPARE [/N] [и] [и] [N]	[N]
RECOMMENDATIONS:	(If different from	om NASA)	
[2 /1R] [P] [F		[A] DD/DELETE)
	RATIONALE: (If appl	icable) ADEQUATE INADEQUATE	[]
CAUSES EXCESSIVE VALVE SLIGHTLY TO MOTOR DAMAGE WOULDS OF JETS ON ANOTHER MANIFOLD	ERS MULTIPLE FAILURE MOTOR OPERATION (CONTENT OF THE CONTENT OF TH	ONTINUOUS POWER TI TANTLY REPEATING T VALVE TO CLOSE, O REDUNDANCY PROV DANCY CAUSES THE	HAT OPENS THE ITSELF). CAUSING VIDED BY JETS
		The second secon	

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSME	ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-614 NASA FMEA #: 05-6KF-2255C-1							L					ASA DA' BASELI N		[x]	
SUBSYSTE MDAC ID:				FRCS 614 DIODE												-		
LEAD ANA	LYS	ST	:	D. HA	RTI	(AN	1			1 11 5	:							.== ·
ASSESSME	ENT	:																
	CR		[CAL] LIGH	ITY		RI	EDUNI	ANC	Y:	SCRE	EN:	S			C]	L EM	a.	
	1		V/FUI			A			В			С				. Lik	•	
NASA IOA]	3	/1R /1R]	[P P]	[P P]	[P P]		[]	*
COMPARE	[/]	[]	[]	[]		[]	
RECOMMEN	VDA'	ric	ONS:	(If	đ	if	ferer	nt f	r	om NA	SA)						
	[/)	[]	[]	[]	(Al	[\QC	/DI] ELE	ETE)
* CIL RE	:			RATION	AL	E:	(If	app)1:	icabl			DEQUAT DEQUAT		[]	

ASSESSMENT ASSESSMENT NASA FMEA	ID:	FRCS-6	515	2			ASA DATA BASELINE NEW			
SUBSYSTEM: MDAC ID: ITEM:		FRCS 615 DIODE					,			
LEAD ANALYS	ST:	D. HAI	RTMA	.N						
ASSESSMENT:	:									
CRI	TICAL:	LTY r	R	EDUN	DANCY	SCREE	NS		CIL	
F	IDW/FUI		A	•	В		С	-		
NASA [] AOI	3 /3 3 /1R]	[[F]	[[P]	[[P]	[[X] *
COMPARE [/N]	[N]	[N	3	[N	1	[N]
RECOMMENDAT	cions:	(If	dif	fere	nt fro	m NAS	A)			
	/]	[]		3	[] (A	[.DD/D] ELETE)
* CIL RETER	TION 1	RATIONA	ALE:	(If	appli	.cable) AI INAI	DEQUATE DEQUATE]]
IOA AGREES	WITH !	NASA FN	ŒΑ.							

ASSESSMENT D ASSESSMENT I NASA FMEA #:	DATE: 1/29/8 ID: FRCS- 05-6K	88 616 F-2255 -:	1	NASA DATA: BASELINE [] NEW [X]					
SUBSYSTEM: MDAC ID: ITEM:	FRCS								
LEAD ANALYST	: D. HA	RTMAN		F 7. 2	<u>.</u>				
ASSESSMENT:									
	CICALITY FLIGHT	REDUNI	DANCY SCR	EENS	CIL				
	W/FUNC	A	В	C	IIIM				
NASA [2 IOA [3	2 /1R] 3 /3]	[P] []	[F] []	[P] []	[X] * []				
COMPARE [N	I /N]	[N]	[N]	[N]	[N]				
RECOMMENDATI	ONS: (If	differe	nt from N	'ASA)					
[3	3 /3]	[]	.[]	[]	[D] (ADD/DELETE)				
* CIL RETENT	TION RATION	ALE: (If	applicab		ATE [] ATE []				
REMARKS: NASA FMEA CO EFFECT.	ONTAINS MUL	riple fa	ILURES.	THIS FAIL	URE ALONE HAS NO				
DISCUSSED.	IT WAS AGR	EED UPON	THAT THE	ISSUE RA	TS 22206 WAS ISED ABOVE WAS THEREFORE, THE				

ISSUE REMAINS OPEN.

ASSESS ASSESS NASA I	MEN MEN FMEA	IT IT . #	DZ II	DATE: 1/29/88 ID: FRCS-617 : 05-6KF-2255 -2								ì		DATA: ELINE NEW	[-	
SUBSYS MDAC I ITEM:	STEM	:			FR 61	.CS												
LEAD A	NAI	YS	T	:	D.	HAI	RTMA	N										
ASSESS	SMEN	IT:																
	C	RI	T	ICAI	JTY		R	EDU	NDA	NC:	y sc	CREE	NS					
				LIGH W/FU			A			1	В		(.		111	er.	
NAS IC	SA OA	[[3	/3 /3]		[]	_	נ נ]		[]		<u>ן</u>]	*
COMPAR	RE	[/]		[]		[]		[3		[]	
RECOM	IEND	ľA	I.	ONS:		(If	dif	fer	ent	f	rom	NAS.	A)					
		[3	/2F	2]		[P)	F ·	[]	Pj		[]	P]	(AI		DEL.	ETE)
* CIL	RET	EN	T:	ION	RAT	ION?	ALE:	(I	f a	pp:	lica			DEOI	JATE	г	1	
DE1/1 D1													INZ	ADEQU	JATE JATE	[j	
THIS I POSITI TO FAI OPERAT	REMARKS: THIS FAILURE MAY CAUSE LOSS OF ACCURATE INDICATION OF THE VALVE POSITION. REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY MAY LEAD TO FALSELY FAILING THE VALVE CLOSED, POSSIBLY EFFECTING MISSION OPERATIONS.																	
ISSUE	ron	F	Œ	SOLV	ED	AT N	1EET	ING	WI	TH	SUE	3SYS	I'EN	AM I	IAGER	ON	1/	20/88.

ASSESSMENT DATE: 1/29 ASSESSMENT ID: FRCS NASA FMEA #: 05-6	9/88 5-618 5KF-2255B-1	NASA DATA: BASELINE [] NEW [X]							
SUBSYSTEM: FRCS MDAC ID: 618 ITEM: DIOD	5								
LEAD ANALYST: D. H	IARTMAN								
ASSESSMENT:									
CRITICALITY FLIGHT HDW/FUNC	ENS CIL ITEM C								
NASA [3 /2R] IOA [3 /1R]	[P] [P] [P] [P]	[P] [] * [P] []							
COMPARE [/N]	[] []	[] []							
RECOMMENDATIONS: (I	If different from NA	SA)							
[3 /1R]	[P] [NA]	[P] [] (ADD/DELETE)							
* CIL RETENTION RATIO	ONALE: (If applicabl	e) ADEQUATE [] INADEQUATE []							
REMARKS: THIS DIODE FAILED OPEN CAUSES INABILITY TO OPEN THE VALVE WITH THE GPC. MANUAL REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET CG LIMITS.									
ISSUE NOT RESOLVED AT THE MEETING WITH THE SUBSYSTEM MANAGER ON 1/20/88.									

ASSESSMENT DAT ASSESSMENT ID: NASA FMEA #:		619	5B-2			DATA ELINE NEW]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 619 DIODE				*. **** ** *			÷
LEAD ANALYST:	D. HA	RTMAN						
ASSESSMENT:								
	ALITY	REI	DUNDANC	Y SCR	EENS		CIL	
FLI HDW/	GHT FUNC	A		В	С		ITE	M
NASA [3 / IOA [3 /	3] 1R]	[F] [P]	· [P]		[x] *
COMPARE [/	ן א	[N]] [иј	[N]		[N]
RECOMMENDATION	s: (If	diff	erent f	rom N	ASA)			
[/] .	[]] [1 .	[]	(A)	[DD/D:] ELETE)
* CIL RETENTIO REMARKS:			(If app	licab		UATE UATE	[]
IOA AGREES WIT	n nasa Fi	MĽA.				_		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/29/88 FRCS-620 05-6KF-2255E-1	NA B	SA DATA: ASELINE [] NEW [X]									
MDAC ID:	FRCS 620 DIODE											
LEAD ANALYST:	D. HARTMAN	ee uu	e en									
ASSESSMENT:												
	CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM											
	NC A	ВС	TIEM									
NASA [3 /1R IOA [3 /3] [P]] []	[F] [P] [X] *									
COMPARE [/N] [N]	[N] [N	ן א ן									
RECOMMENDATIONS:	(If different	: from NASA)										
[3 /3] []	[] [] [D] (ADD/DELETE)									
* CIL RETENTION	RATIONALE: (If a	AD	PEQUATE [] PEQUATE []									
REMARKS: NASA FMEA CONSID EFFECT.	ERS MULTIPLE FAI	LURES. THIS	FAILURE ALONE HAS NO									
AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.												

ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-62 05-6KF-	1 2255E-2		nasa dat Baselii Ni	FA: NE [] EW [X]
SUBSYSTEM: MDAC ID: ITEM:				\$ x ₁ · · · ₁	
LEAD ANALYST:	D. HART	MAN			
ASSESSMENT:					
CRITICAL FLIGH	ITY T	REDUNDA	NCY SCRE	ENS	CIL ITEM
HDW/FU	NC	A	В	С	
NASA [3 /1R IOA [3 /3] [P]	[F]	[P] []	[X] *
COMPARE [/N] [n j	[и]	[N]	[N]
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)	
[2 /1R) (P]	[F]		[A] (ADD/DELETE)
* CIL RETENTION		E: (If a		.e) ADEQUATI INADEQUATI	E []
REMARKS: NASA FMEA CONSID CAUSES EXCESSIVE VALVE SLIGHTLY T MOTOR DAMAGE WOU LOSS OF JETS ON ON ANOTHER MANIF EXPEL PROPELLANT	MOTOR O HEN CLOS LD LIKEL ASSOCIAT OLD. LO S TO MEE	PERATION ES IT, CO Y CAUSE T ED MANIFO SS OF REI T CG CONS	(CONTIN ONSTANTI THE VALV OLD. RE DUNDANCY STRAINTS	THIS FAILER TUOUS POWER Y REPEATING E TO CLOSE, DUNDANCY PE CAUSES THE	SHORT DIODE THAT OPENS THE ITSELF). CAUSING ROVIDED BY JETS INABILITY TO
AT MEETING WITH DISCUSSED. IT W					

DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE

ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/29/88 FRCS-622 05-6KF-2	2 2255 - 1		NASA DATA: BASELINE [] NEW [X]				
	FRCS 622 DIODE			·				
LEAD ANALYST:	D. HARTI	MAN						
ASSESSMENT:								
CRITICAL FLIGH	ITY T	REDUNDA	NCY SCRE	ENS	CIL ITEM			
	йC	A	В	С				
NASA [2 /1R IOA [3 /3] [P]	[F] []	[P] []	[X] *			
COMPARE [N /N] [N]	[N]	[N]	[и]			
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)				
[3 /3	1, ,	J	[]	[] ([D] ADD/DELETE)			
* CIL RETENTION	RATIONAL	E: (If a	pplicabl	e) ADEQUATE INADEQUATE	[]			
REMARKS: NASA FMEA CONTAI EFFECT.	ns multi	PLE FAIL	URES. T					
AT MEETING WITH DISCUSSED. IT W DUE TO DIFFERENT ISSUE REMAINS OP	AS AGREE	D UPON T	HAT THE	ISSUE RAISE	D ABOVE WAS			

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-623 NASA FMEA #: 05-6KF-2255 -2										ASA DA' BASELI N					
SUBSYSTE MDAC ID: ITEM:				FRO 623 DIC	3										
LEAD ANA	LY	ST	:	D.	HAR	TM	/N								
ASSESSME	ENT	:													
	CR		ICALI			I	REDUN	DANCY	sc.	REEN	S		CI	L EM	
	1		A/FUN			7	4	E	3		С			LIM	
NASA IOA	[3	/3 /3].	-	[]]]	- []]] *	•
COMPARE	[/]		[]	[]	נ]	[]	
RECOMMEN	IDA!	ric	ons:	((If	dii	fere	nt fr	com	NASA)				
	[3	/2R]		[]	9]	[]	9]	[P		[(ADD/	DELET	E)
* CIL RE	TE	NT:	ION I	[TAS	ONA	LE:	(If	appl	ica	ble)	 A.F	NEOITA TO	er r	,	
REMARKS:										I	NAI	DEQUAT:	E []	
THIS FAI	LU														
POSITION TO FALSE OPERATIO	ELY NS	F.		ig 1	HE			LOSE), F	POSSI	BLY		CTING	MISS	
			6 · ·					P. 4 . 12.		,s			rus" -		

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSMENT DATE: 1/2 ASSESSMENT ID: FRC NASA FMEA #: 05-	9/88 S-624 6KF-2268 - 1	NASA DAT BASELIN NE	'A: IE [] IW [X]
SUBSYSTEM: FRC MDAC ID: 624 ITEM: DIO			
LEAD ANALYST: D.	HARTMAN	त्रहास्त्राच्या १००० च्या १००० इ.स.च्या १९७० च्या १९७० च्या १९०० च्या १९०० च्या १९०० च्या १९०० च्या १९०० च्या १९०० च्या १९०० च्या १९०० च्या १	राष्ट्राम्बर गाणापूर्वत् । सन्दर्भ
ASSESSMENT:			
FLIGHT	REDUNDANCY		CIL ITEM
HDW/FUNC	A B	C	
NASA [3 /3] IOA [3 /3]] []] [] -	[] *
COMPARE [/]	[] [] []	[]
RECOMMENDATIONS: (If different fro	m NASA)	
[3 /2R]	[P] [P] [P] ([] ADD/DELETE)
* CIL RETENTION RATIO	ONALE: (If appli	.cable) ADEQUATE	: []
DEWI DVC.		INADEQUATE	Ĺ
REMARKS: THIS FAILURE MAY CAUSED FOSITION. REDUNDANCE TO FALSELY FAILING TO OPERATIONS.	Y PROVIDED. LOS	S OF ALL REDUND	ANCY MAY LEAD
ISSUE NOT RESOLVED A	T MEETING WITH S	UBSYSTEM MANAGE	R ON 1/20/88.

ASSESSME ASSESSME NASA FME	NT I		FRCS)/88 5-625 5KF-22	68 -	·2			SA DATA ASELINI NEV]
SUBSYSTE MDAC ID: ITEM:	M:		FRCS 625 DIOI					: "=			
LEAD ANA	LYST	:	D. F	IARTMA	N.						
ASSESSME	NT:										
		ICAL		R	EDUN	IDANCY	SCR	REENS		CIL	
		W/FU		A	.	В		С			
NASA IOA		/1R /3]	[F)	[P]	¶] []	[] *
COMPARE	[/N]	[]]	[N]	[N]	[N	[]
RECOMMEN	DATI	ons:	(1	[f dif	fere	ent fr	om N	IASA)			
	[/]	[]	[]	[] (2	[ADD/E] ELETE)
* CIL RE	TENT	'ION	RATI(ONALE:	(II)	appl	icab	AD	EQUATE EQUATE]
REMARKS:	TE W	נדיים	NACA	EMEA							

ASSESSMENT I ASSESSMENT I NASA FMEA #:	DATE: ID:	1/29/8 FRCS-6 05-6KF	8 26 '-22	58 - 1				ASA DATA BASELINE NEW			
SUBSYSTEM: MDAC ID: ITEM:		FRCS 626 DIODE					-				+ 150 + +
LEAD ANALYS	r:	D. HAF	(AMT	1							
ASSESSMENT:											
CRITICALITY REDUNDANCY SCREENS											
	FLIGHT DW/FUN	iC	A B C							M	
NASA [:	3 /3 3 /3]	[]	[]	[]	[]	*
COMPARE [/]	[]	[]	[]	Ε	3	
RECOMMENDAT	ions:	(If	dif	ferent	fr	om NAS	SA)				
	3 /2R]	[P]	[P]	[P] (A	[DD/D		
* CIL RETEN	TION F	RATION	ALE:	(If a	appl	icable		DEQUATE	[]	
							INA	DEQUATE		j	
REMARKS: THIS FAILURE MAY CAUSE LOSS OF ACCURATE INDICATION OF THE VALVE POSITION. REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY MAY LEAD TO FALSELY FAILING THE VALVE CLOSED, POSSIBLY EFFECTING MISSION OPERATIONS.											

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSME ASSESSME NASA FME	NT I	IĎ:	1/29/ FRCS- 05-6K	627		-2					DATA SELINE NEW	[
SUBSYSTEM MDAC ID:	M:		FRCS 627 DIODE												
LEAD ANA	LYSI	r:	D. HA	RTM	AN			*					-	÷	
ASSESSME	NT:														
•		rical Fligh			RED	UNDAN	CY	SCRE	ENS	5			IL FEM	¶	
	HI	OW/FU	NC		A		В			С					
NASA IOA	[3	3 /1R 3 /3]	[P]	[]	P]	[P]		[]	*
COMPARE	נ	/N	1	[N]	[N]	[N]		[N]	
RECOMMEN	DAT]	IONS:	(If	di	ffe	rent	fro	om NAS	SA))					
	[/	1.	(]	[]	[]	(A	DD,	/DE] :LE	ETE :
* CIL RE	rent	rion 1	RATION	ALE	: (If ap	pli	icable			UATE UATE	[]	
REMARKS:	FC T	מדחים ו	NACA F	MTE' Å					TI	1ADEQ	CALE	L		J	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-628 05-6KF-22			NA B	SA DATA ASELINE NEW				
SUBSYSTEM: MDAC ID:	FRCS 628 DIODE							. <u></u>	ندي الجانب
LEAD ANALYST:	D. HARTM	AN			·	•	. =		* * *
ASSESSMENT:									
TT TOU	ITY 1 T NC 2		ANCY B		ENS C		CIL		
NASA [3 /3 IOA [3 /3] []]]	[]	[] *]	
COMPARE [/] []	[]	[]	[]	
RECOMMENDATIONS:	(If di	fferen	t fr	om NA	SA)				
[/] []	[]	[] (A	[DD/D] ELETE)
* CIL RETENTION	RATIONALE	: (If	appl	icabl	.e)				
					AD INAD	EQUATE EQUATE	[]	
REMARKS: LOSE 1 OF 2 GPC BY SECOND GPC CO COUPLED WITH THE ISOLATION OF A T	MMAND AND LOSS OF 2	MANUA ALL HA	L CL	OSE C	LVE.	REDUND	ANCY S OF	PROV THIS	,
SUBSYSTEM MANAGE LEAK BECAUSE THE HAS TO BE MANUAL	TIME TO	EFFECT	CAN	BE U	IP TO	24 HOUR	S (S	OFTWA	RE

THIS RATIONALE.

ASSESSMENT DAY ASSESSMENT ID NASA FMEA #:	FRCS-	629	5A-2			DATA: CLINE [] NEW [X]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 629 DIODE				il _{Line}	
LEAD ANALYST:	D. HAI	RTMAN				
ASSESSMENT:						
FL:	CALITY		DUNDANC			CIL ITEM
HDW,	/FUNC	A		В	С	
NASA [3 ,	/3] /1R]	[F] [P]	[] [P]	[x]
COMPARE [/N]	[N]] [ן א	[N]	[N]
RECOMMENDATION	NS: (If	diffe	erent f	rom NA	SA)	
.]	/]	[]] []	[]	[] (ADD/DELETE)
* CIL RETENTION	ON RATION	ALE:	(If app	licabl	.e) <u></u>	
					ADEQU INADEQU	ATE []
REMARKS: IOA AGREES WI'	TH NASA FI	MEA.				a a característico

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	FRCS-630	55A-1	NASA DATA: BASELINE [] NEW [X]								
SUBSYSTEM: MDAC ID: ITEM:	FRCS 630 DIODE										
LEAD ANALYST:	D. HARTMA	N									
ASSESSMENT:											
CRITICA	CIL										
FLIG HDW/F	INC A	TIE	M								
NASA [3 /3 IOA [3 /3] [] []		[] *					
COMPARE [/] [] []	[]	[1					
RECOMMENDATIONS	: (If dif	ferent f	rom NASA	A)							
[/] [] []	[] (2] ELETE)					
* CIL RETENTION	RATIONALE:	(If app	licable		_	_					
			:	ADEQUATE INADEQUATE] 					
REMARKS: LOSE 1 OF 2 GPC COMMANDS TO CLOSE THE VALVE. REDUNDANCY PROVIDED BY SECOND GPC COMMAND AND MANUAL CLOSE COMMAND. LOSS OF THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY, MAY PREVENT ISOLATION OF A THRUSTER LEAK.											

SUBSYSTEM MANAGER STATED THAT THE GPC IS NOT USED TO ISOLATE A LEAK BECAUSE THE TIME TO EFFECT CAN BE UP TO 24 HOURS (SOFTWARE HAS TO BE MANUALLY LOADED). IOA WITHDRAWS THEIR ISSUE BASED ON THIS RATIONALE.

ASSESSME	ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-631 NASA FMEA #: 05-6KF-2255A-2								1-2							ASA BASI	ELI		[]	
SUBSYSTE MDAC ID:				FR6 63: DI6																		
LEAD ANA	LYS	ST:	:	D.	HAI	RTI	IAN	N.											-			
ASSESSME	NT	:																				
	CR:		ICAL: LIGH!				RI	EDU	IND?	AN(CY	sc	REE	38	3				CI	L EM	ſ	
	I		N/FUI				A				В				С					. Dr	•	
NASA IOA	[3	/3 /1R]		[F]]	P]		[[P]			[X]	*
COMPARE	C		/N]		[N]		[N]	ļ	[N]			[N]	
RECOMMEN	DA!	CIC	ONS:		(If	d:	if	fer	ent	. 1	fro	om	NASZ	A)								
	[/]		[]		[]	į	[]		(AI	[DD/	DE] ELE	TE)
* CIL RE		T	ION 1	RAT:	IONZ	L	Ε:	(I	f a	apj	91 :	ica				DEQU DEQU			[]	
IOA AGRE	ES																		14.2 14.5			÷

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-632	SD-1		NASA DA' BASELII]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 632 DIODE			· · · · · · · · · · · · · · · · · · ·	•	•
LEAD ANALYST:	D. HARTMAN					
ASSESSMENT:						
CRITICA FLIG		OUNDANCY	SCREENS	5	CIL	
HDW/FC		В		С		
NASA [3 /11 IOA [3 /3		[P] [P]	[] *
COMPARE [/N] [и]	[14] [N]	[]
RECOMMENDATIONS	(If diffe	erent fro	om NASA)		
1 /] []	Ε] []	[(ADD/D] ELETE
* CIL RETENTION	RATIONALE: ([If appli	•	ADEQUAT NADEQUAT	•]
REMARKS: IOA AGREES WITH	NASA FMEA.					

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-633 NASA FMEA #: 05-6KF-2255D-2									NASA DATA: BASELINE [] NEW [X]											
SUBSYSTE MDAC ID: ITEM:	M:			63	RCS 33 CODE									erii j	52 <u>-</u>			<u>.</u> .	Ē	
LEAD ANA	LYS	T:	:	D.	HAI	RT!	MAI	N												
ASSESSME	NT:																			
	CRI		CAL		7		RI	EDU	ND	N	CY	SCF	REENS	3				[L [EN		
	H		LIGH' V/FU				A				В			С	=		1.	l Ei	1	
NASA IOA	[3 3	/3 /1R]		[F]		[P]]	P]		[[X]	*
COMPARE	[/N]		[N]		[N	1	[N]		[N]	
RECOMMEN	DAT	'IC	ons:		(If	d	if	fer	ent	: 1	fro	om N	IASA))						
	[/]		[3		[]	(] (] ELE	ETE)
* CIL RE	TEN	T)	EON I	RAI	CION	AL	E:	(I	fa	pp) 1:	cat		ΑI	DEQUATE DEQUATE	!)	[[]	
REMARKS: IOA AGRE	ES	W]	TH I	NAS	SA FI	Æ.	Α.													

ASSESSME ASSESSME NASA FME	NT NT A	- -									DATA ELINE NEW	[]					
SUBSYSTE MDAC ID:	M:			FI 6:	RCS														
LEAD ANA	LY	ST	:	D.	. HAI	RTI	MAI	1											
ASSESSME	NT	:																	
	CR:		ICAL LIGH		7		RI	EDUND	AN	CY	SCR	REEN	S			C]	[L [EN		
	1						A		в с						LIST	1			
NASA IOA	[3 3	/1R /3]		[P]	[F]	[P]		[X]	*
COMPARE	[/N]		[N]	[N]	[N]		[N]	
RECOMMEN	'DA'	ri(ons:		(If	đ:	if	feren	t :	fr	om N	IASA)						
gen steel e	[3	/3]		[j	[j"	[]	(A)	[DD/	D DI] ELH	ETE)
* CIL RE	TE	NT:	ION	RAT	ION	ALI	E:	(If	apj	pl:	icab	•	Al	DEQU	JATE	[]	
REMARKS: NASA FME EFFECT.	A (CO	NTAI	NS	MUL	ri)	PLI	E FAI	LUI	RE	5.				JATE LURE	_		_	HAS NO
AT MEETI DISCUSSE DUE TO D ISSUE RE	D.	FE:	IT W RENT	AS Il	AGRI VTER	EEI	D T	JPON	TH	ΑT	THE	IS	SUI	E RA	AISED	AI	708	Æ	WAS

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-635 05-6KF-2255F-2	2	NASA DAT BASELIN NE	YA: ME[] MW[X]
MDAC ID:	FRCS 635 DIODE			7 T
LEAD ANALYST:	D. HARTMAN			
ASSESSMENT:				
ET TCI	LITY REDUNI			CIL ITEM
HDW/FU	JNC A	В _	C	
NASA [3 /11 IOA [3 /3	R] [P]	[F] []	[P] []	[X] * []
COMPARE [/N] [N]	[и]	[N]	[N]
RECOMMENDATIONS	: (If differen	nt from N	ASA)	
[2 /1]	R] [P]	[F]	[P]	[A] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (If	applicab	le) ADEQUATI INADEQUATI	
REMARKS: NASA FMEA CONSIDER CAUSES EXCESSIVE VALVE SLIGHTLY F MOTOR DAMAGE WOO LOSS OF JETS ON ON ANOTHER MANIE EXPEL PROPELLANT	E MOTOR OPERATION OF THEM CLOSES IT, ULD LIKELY CAUSTASSOCIATED MANTED TOLD. LOSS OF THE MANTE OF THE PROPERTY	ON (CONTICONSTANT) CONSTANT E THE VALUE IFOLD. R REDUNDANC	NUOUS POWER LY REPEATING VE TO CLOSE, EDUNDANCY PI Y CAUSES THI	THAT OPENS THE GITSELF). CAUSING ROVIDED BY JETS
AT MEETING WITH DISCUSSED. IT DUE TO DIFFERENT ISSUE REMAINS OF	WAS AGREED UPON I INTERPRETATION	THAT THE	ISSUE RAISE	ED ABOVE WAS

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-636 NASA FMEA #: 05-6KF-2255C-1									asa i Basei		[]
SUBSYSTE MDAC ID: ITEM:			FRCS 636 DIOD									
LEAD ANA	LYST	!:	D. H	ARTMA	N							
ASSESSME	NT:											
			ITY	R	EDUN	IDANCY	SCR	EENS	÷	=	CII	
		LIGH W/FU		A	•	В		С			112	·M
NASA IOA	[3	/1R]	[P]	[P [P]	[P]]] *
COMPARE	[/]	[]	[]	[]	-	[1
RECOMMEN	IDATI	ons:	(1	fdif	fere	ent fro	om N	ASA)		v	- <u>-</u>	e ryegir e
and and look	[/	1	[]	[]	[]	(A	[DD/I] ELETE)
* CIL RE	TENT	NOI	RATIC	NALE:	(If	appl	icab	À	DEQUA		[]
REMARKS:		ES.							~			

ASSESSME ASSESSME NASA FME	NT I	D:	1/29/ FRCS- 05-6K	637	255C-	·2		NASA I BASEI		
SUBSYSTE MDAC ID: ITEM:			FRCS 637 DIODE							• . •
LEAD ANA	LYST	:	D. HA	RTM	AN					
ASSESSME	NT:									
		ICAL: LIGH	ITY I	1	REDUN	DANCY	SCR	REENS	CIL ITEM	
			NC	2	A	В		С		
NASA IOA	[3 [3	/3 /1R]	[]] F]	[[P]	[] [P]	[*
COMPARE	[/N	3	[]	1]	[N	J	[N]	[N]	
RECOMMEN	DATI	ons:	(If	di	ffere	nt fr	om N	IASA)		
	[/]	[]	ſ]	[]	[] (ADD/DEI	ETE)
* CIL RE	TENT	ION 1	RATION	ALE:	: (If	appl	icab	ole) ADEQUA INADEQUA		
REMARKS: IOA AGRE	ES W	ITH I	NASA F	MEA.	•				н .	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		NASA DATA BASELINE NEW	
MDAC ID:	FRCS 638 DIODE		
LEAD ANALYST:	D. HARTMAN		
ASSESSMENT:			
CRITICALI FLIGHT		SCREENS	CIL ITEM
HDW/FUN		c	TTEM
NASA [2 /1R IOA [3 /3] [P]] []	* [X] *
COMPARE [N /N] [N] [N] [N]	[N]
RECOMMENDATIONS:	(If different fro	om NASA)	
[3 /3] [] [[D] DD/DELETE)
* CIL RETENTION F	RATIONALE: (If appli	ADEQUATE	[]
REMARKS: NASA FMEA CONTAIN EFFECT.	NS MULTIPLE FAILURES	INADEQUATE 5. THIS FAILURE A	•
	_		

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-639 NASA FMEA #: 05-6KF-2255 -2										ASA D BASEL		[]					
SUBSYSTE MDAC ID:				63	FRCS 539 DIODE													
LEAD ANALYST: D. HARTMAN																		
ASSESSME	ASSESSMENT:																	
CRITICALITY REDUNDANCY SCREENS FLIGHT									CII	-								
	1		W/FU				A			В			С					
NASA IOA	[3 3	/3 /3]		[]	[]) []		[]	*
COMPARE	[/]		[]	[]	(]		[]	
RECOMMEN	IDA'	TI:	ons:		(If	đi	ifí	feren	nt	fro	om N	ASA	.)					
	[3	/2R)		[P]	[P]	(P]		[DD/[
* CIL RE	TE	NT	ION	RAI	NOI	ALI	€:	(If	ap	pl:	icab		Δl	TEOUS	TE	[]	
INADEQUATE [] REMARKS: THIS FAILURE MAY CAUSE LOSS OF ACCURATE INDICATION OF THE VALVE POSITION. REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY MAY LEAD TO FALSELY FAILING THE VALVE CLOSED, POSSIBLY EFFECTING MISSION OPERATIONS.																		
TEGUE NOW DESCRIPT AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.																		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-640 05-6KF-22	255B - 1		NASA DATA BASELINE NEW	-			
SUBSYSTEM: MDAC ID:	FRCS 640 DIODE							
LEAD ANALYST:	D. HARTMA	AN						
ASSESSMENT:								
CRITICAL FLIGH	ITY R	REDUNDAN	CY SCREE	ens	CIL ITEM			
HDW/FU	_	A	В	C				
NASA [3 /2R IOA [3 /1R] [F	P] [P] [P] P]	[P] [P]	[] *			
COMPARE [/N] [] []	[]	[]			
RECOMMENDATIONS:	(If dif	fferent	from NAS	SA)				
[3 /1R] [F	P] [NA]		[] DD/DELETE)			
* CIL RETENTION	RATIONALE:	: (If ap	plicable	ADEQUATE INADEQUATE				
REMARKS: THIS DIODE FAILED OPEN CAUSES INABILITY TO OPEN THE VALVE WITH THE GPC. MANUAL REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY CAUSES LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET CG LIMITS.								

ISSUE NOT RESOLVED AT THE MEETING WITH THE SUBSYSTEM MANAGER ON 1/20/88.

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-641 NASA FMEA #: 05-6KF-2255B-2								NASA DATA: BASELINE [] NEW [X]								
SUBSYSTEM MDAC ID:			FRCS 641 DIOD													
LEAD ANA	LYST	:	D. H.	ARTM	IAN											
ASSESSME	NT:															ē
•	F	ICAL LIGH			RE A		DAN	CY B	SCR	EENS	S C			CIL		
WA CA		•					r	_	,	r	-			r	7	*
NASA IOA	[3	/1R]	[F]	[P]	ĺ	P]		[X]	•
COMPARE	[/N]	[N]	[N]	[N]		[N]	
RECOMMEN	DATI	ons:	(I	f di	ff	ere	nt	fr	om N	ASA))					·
	[/	3	C]	[]	[]	(A	[DD/D] ELE	TE)
* CIL RE	TENT	ION 1	RATIO	NALE	E:	(If	ap	pl:	icab		IA IAN	DEQU DEQU	ATE ATE	[]	
REMARKS: IOA AGRE	ES. W	ITH 1	NASA	FMEA	۱.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-642	NASA DATA: BASELINE NEW	[x]
MDAC ID:	FRCS 642 DIODE	e my	
LEAD ANALYST:	D. HARTMAN		
ASSESSMENT:			
FT.TCH'	ITY REDUNDA		CIL ITEM
HDW/FU	NC A	ВС	
NASA [3 /1R IOA [3 /3] [P]] []	[F] [P] [] []	[X] * []
COMPARE [/N	ן [א]	[и] [и]	[N]
RECOMMENDATIONS:	(If different	t from NASA)	1
[3 /3] []		[D] D/DELETE)
* CIL RETENTION	RATIONALE: (If	applicable) ADEQUATE INADEQUATE	[]
CAUSES EXCESSIVE	MOTOR OPERATION HEN CLOSES IT, LD LIKELY CAUSE	ILURES. THIS FAILED S N (CONTINUOUS POWER TH CONSTANTLY REPEATING I THE VALVE TO CLOSE, C	AT OPENS THE TSELF). AUSING
DISCUSSED. IT W	AS AGREED UPON INTERPRETATION	ER ON 1/20/88, NSTS 22 THAT THE ISSUE RAISED S OF NSTS 22206. THER	ABOVE WAS

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-64 05-6KF-		NASA DATA BASELINE NEW	: [x]	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 643 DIODE				
LEAD ANALYST:	D. HART	MAN			
ASSESSMENT:					
CRITICAL FLIGH	ITY	REDUNDAN	CY SCREEN	S	CIL ITEM
		A	В		TIEM
NASA [3 /1R IOA [3 /3] [P] [F] [P]	[X] *
COMPARE [/N] [и] [и ј [N]	[N]
RECOMMENDATIONS:	(If d	ifferent :	from NASA)	
[2 /1R] [P] [F] [P] (Al	[A] DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If ap		ADEQUATE NADEQUATE	[]
REMARKS: NASA FMEA CONSID CAUSES EXCESSIVE VALVE SLIGHTLY T MOTOR DAMAGE WOU LOSS OF JETS ON ON ANOTHER MANIF EXPEL PROPELLANT	MOTOR OF THE NOTOR	PERATION ES IT, COI Y CAUSE TI ED MANIFOI SS OF REDU	URES. THE (CONTINUOUS NSTANTLY IN HE VALVE TO LD. REDUINDANCY CA	IS FAILED S US POWER TH REPEATING D TO CLOSE, O NDANCY PROV	SHORT DIODE HAT OPENS THE ITSELF). CAUSING VIDED BY JETS
AT MEETING WITH OUSCUSSED. IT W					

ISSUE REMAINS OPEN.

DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	NASA DATA BASELINI NEV						
MDAC ID:	FRCS 644 DIODE						
LEAD ANALYST:	D. HARTMAN						
ASSESSMENT:							
CRITICAL FLIGH		SCREENS	CIL ITEM				
HDW/FU		3 C					
NASA [2 /1R IOA [3 /3] [P] [I	F] [P]	[X] * []				
COMPARE [N /N] [N] [1	и] [и]	[n]				
RECOMMENDATIONS:	(If different fi	com NASA)					
[3 /3] [] [] []	[D] ADD/DELETE)				
	RATIONALE: (If appl	licable) ADEQUATE INADEQUATE					
REMARKS: NASA FMEA CONTAI EFFECT.	NS MULTIPLE FAILURI	ES. THIS FAILURE	ALONE HAS NO				
AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.							

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-645 NASA FMEA #: 05-6KF-2255 -2											DATA ELINE NEW	[]				
SUBSYSTE MDAC ID:	EM:			FRO 645 DIC	CS 5													
LEAD ANA	ALY	ST	:	D.	HAR	TM	AN											
ASSESSME	ENT	:																
	CR		ICAL:				REDUN	DANC	Y	SCR	EENS			CI	L EM			
	1		W/FUI			•	A		В			C ,	-1. 1 -	11	. E.M			
NASA IOA	[3	/3 /3]		[[]	[]]]		[] '	*	
COMPARE	[1]		[]	[]	[)		[]		
RECOMMEN	NDA'	rI(ons:	((If	di	ffere	nt f	ro	m N	ASA)							
	[3	/2R]		[P].	, [P]	[P]		[DD/			ΓE)	
* CIL RI	ETE	NT:	ION I	RATI	ONA	LE	: (If	app	1i	cab		ADEQU	JATE JATE	[]		
REMARKS: THIS FAI POSITION TO FALSE OPERATION	LLUI 1. ELY	R F	EDUNI	DANC	Y P	RO	VIDED	. L	OS.	s o	IND F AL	ICATI L REI	ON O	F I	HE M	ΑY	LE	AD
TESTIF NO	ייית ו	D Fr	SOLVI	מ חק	.mr mr	'स स	יידאכ י	שיידש	S	UBS	VSTE	м ман	JAGER	ON	1	/20) / R	88.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-646		BASELINE NEW		
SUBSYSTEM: MDAC ID: ITEM:	FRCS 646 DIODE				
LEAD ANALYST:	D. HARTMA	N			
ASSESSMENT:					
CRITICAL FLIGH		REDUNDANCY	SCREENS		CIL ITEM
HDW/FU		À È	3	C	11111
NASA [3 /3 IOA [3 /3] [] [] []	[] *
COMPARE [/] [] [.] []	[]
RECOMMENDATIONS:	(If dif	ferent fr	om NASA)		
[3 /2R	t] [F	?][I	·] [:	P] (A	[] DD/DELETE)
* CIL RETENTION	RATIONALE:	(If appl		ADEQUATE ADEQUATE	
REMARKS: THIS FAILURE MAY POSITION. REDUN TO FALSELY FAILI OPERATIONS.	DANCY PROV	TIDED. LO	TRATE IND	ICATION O L REDUNDA	F THE VALVE NCY MAY LEAD
ISSUE NOT RESOLV	ED AT MEET	ING WITH	SUBSYSTE	M MANAGER	ON 1/20/88.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-647 05-6KF-22	NASA DATA: BASELINE [] NEW [X]							
SUBSYSTEM: MDAC ID: ITEM:	FRCS 647 DIODE								
LEAD ANALYST:	D. HARTMA	N							
ASSESSMENT:									
CRITICAL FLIGH	r	EDUNDA	NCY SCR		CIL ITEM				
HDW/FU	NC A		В	С					
NASA [3 /1R IOA [3 /3] [P]	[P] []	[P] []	[] *				
COMPARE [/N] [N]	[N]	[N]	[N]				
RECOMMENDATIONS:	(If dif	ferent	from N	(ASA)					
. [/] []	[]	.[]	[] (ADD/DELETE)				
* CIL RETENTION DE REMARKS: IOA AGREES WITH DE REMARKS		(If a	pplicab	ole) ADEQUATI INADEQUATI					
TOW WONTED WITH I	MADA THUA.								

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SUBSYSTIMDAC ID:	EM:			FR6	CS					•					
LEAD AND	ALY	ST	: .	D.	HAR	TMA	N								
ASSESSMI	ENT	:													
CRITICALITY REDUNDANCY SCREENS FLIGHT HDW/FUNC A B C													CII		
	1	HD	W/FU	NC		A		В		C	!				
NASA IOA	[3	/3 /3]		[[]	[.]	[[]		[]	*
COMPARE	[/]		[]	[]	τ]		[]	
RECOMME	NDA'	rI(ons:		(If	dif	fere	nt fro	om Ni	ASA)					
	[3	/2R]		[F)	[P]	[P]	(A)	[DD/I	ELE	TE)
* CIL RI		NT:	ION 1	RAT:	IONA	LE:	(If	appl	(cab	A]	
THIS FAT POSITION TO FALS	ADEQUATE [] INADEQUATE [] REMARKS: THIS FAILURE MAY CAUSE LOSS OF ACCURATE INDICATION OF THE VALVE POSITION. REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY MAY LEAD TO FALSELY FAILING THE VALVE CLOSED, POSSIBLY EFFECTING MISSION DEPERATIONS.														
ISSUE NO	OT :	RE	SOLV:	ED 2	AT M	EEI	ING	WITH S	SUBS	YSTEM	MAN	AGER	ON	1/2	0/88.

ASSESSME ASSESSME NASA FME	NT I	D:	FRCS	-649		8 -2				-		ASA DA BASELI N		[x]	10 m m m m m m m m m m m m m m m m m m m
SUBSYSTE MDAC ID: ITEM:	M:		FRCS 649 DIOD	E													
LEAD ANA	LYST	:	D. H.	ARTM	IAN												
ASSESSME	NT:																
		ICALI LIGHT			RE	DUND	ANG	CY	SCRE	ENS	5			CI TT	L EM	T	
		W/FUI			A			В			С						
NASA ·IOA	[3 [3	/1R /3]	[P]]	P].]]	P]]]	*
COMPARE	[/N]	[N]	[N]	[N]		[N]	
RECOMMEN	DATI	ons:	(I	f di	ff	eren	t i	fro	om NA	SA)	t						
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* CIL RE	TENT	ION I	RATIO	NALE	:	(If	apı	pli	icabl			DEQUAT DEQUAT		[]	
REMARKS:		. •										~		٠		•	

IOA AGREES WITH NASA FMEA.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-650) 255A-1		NASA DATA BASELINI NEV]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 650 DIODE					
LEAD ANALYST:	D. HARTM	IAN				
ASSESSMENT:						
CRITICAL FLIGH		REDUNDAN	CY SCREI	ens	CIL	wr
HDW/FU		A	В	C		•
NASA [3 /3 IOA [3 /3] [] []	[]	[] *]
COMPARE [/] [] []	[]	[]
RECOMMENDATIONS:	(If di	.fferent	from NAS	SA)	VII	
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* CIL RETENTION	RATIONALE	: (If ap	plicable	adequate	(1
REMARKS:				INADEQUATE	Ē	j
LOSE 1 OF 2 GPC BY SECOND GPC CO COUPLED WITH THE ISOLATION OF A T	MMAND AND LOSS OF	MANUAL ALL HARD	CLOSE C	DMMAND. LOS	SS OF	THIS,

SUBSYSTEM MANAGER STATED THAT THE GPC IS NOT USED TO ISOLATE A LEAK BECAUSE THE TIME TO EFFECT CAN BE UP TO 24 HOURS (SOFTWARE HAS TO BE MANUALLY LOADED). IOA WITHDRAWS THEIR ISSUE BASED ON THIS RATIONALE.

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ASSES	SSESSMENT DATE: 1/29/88 SSESSMENT ID: FRCS-651 ASA FMEA #: 05-6KF-2255A- UBSYSTEM: FRCS															DAT? ELINI NEV] 3]	
SUBSY MDAC ITEM:	ID:	ſ:			65			-												
LEAD	ANAI	LYS!	T:		D.	HAF	(TI	IAM	1											
ASSES	SMEN	IT:				•														
	c]	TIC FLI DW/	GH7	ľ	•		RI A	EDUN	DAN	CY B	SCF	REEN	s C				IL TE	M	
NA I	SA OA	[:	3 /	3 1R]		[F]	[P]]	P]]	x]	*
COMPA	RE	[/	N]		[N]	(N]	[N]		[N]	
RECOM	MENE	AT:	ION	s:		(If	đ:	ifi	fere	nt	fr	a mc	IASA	.)						
		[/		3		[]	(]	[]	(Z] DD	/ DI] ELE	TE)
* CII		EN'	TIO	N F	RAT	IONA	LI	€:	(If	ap	pl:	icak				JATE JATE	[]	

IOA AGREES WITH NASA FMEA.

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SUBSYSTEM MDAC ID: ITEM:				2									
LEAD ANAI	LYST	:	D. HZ	ARTM	M								
ASSESSMEN	T:												
CRITICALITY REDUNDANCY SCREENS CITY FLIGHT ITY HDW/FUNC A B C													
	HD	W/FU	NC	7	7	F	3	C	:				
NASA IOA	[3 [3	/3 /3]]]	[]	[]		.[]]	*
COMPARE	[/]	[]	[]	[]		[]	
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	[/]	[]	[]	[]		[· [D/D]		ETE)
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SUBSYSTEM LEAK BECA HAS TO BI	AUSE	THE	TIME	TO I	EFFEC	T CAN	I BE	UP TO	24	HOURS	S (S	OF'	WARE

THIS RATIONALE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-653 05-6KF-2	255A-2		NASA DATA BASELINE NEW	
	FRCS 653 DIODE				
LEAD ANALYST:	D. HARTM	AN			
ASSESSMENT:					
CRITICAL: FLIGHT HDW/FUI	r	REDUNDA A	ANCY SCRE B	ENS C	CIL ITEM
NASA [3 /3 IOA [3 /1R] [:] F]	[] [P]	[] [P]	[] *
COMPARE [/N] []	1]	[N]	[N]	[N]
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* CIL RETENTION I	RATIONALE	: (If a	pplicabl	e) ADEQUATE INADEQUATE	[]
IOA AGREES WITH	NASA FMEA	•			•

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-654 05-6KF-22	255D-1				DATA: ELINE NEW	: [[x]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 654 DIODE						· ·	• 52
LEAD ANALYST:	D. HARTM	AN		re s	na n	-	*	
ASSESSMENT:								
CRITICAL FLIGH		REDUND	ANCY	SCREEN	is .		CIL	
HDW/FU		A	В		С			
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COMPARE [/N] [и]	[N] [N]	·	[]
RECOMMENDATIONS:	(If di	fferen	t fro	m NASA	L)			
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* CIL RETENTION REMARKS: IOA AGREES WITH			appli		ADEQ NADEQ	UATE UATE	[]
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ASSESSME ASSESSME NASA FME	NT ID:	1/29/88 FRCS-65 05-6KF-	5	2	NASA BASE	
SUBSYSTEMDAC ID:	M:	FRCS 655 DIODE				
LEAD ANA	LYST:	D. HART	MAN			
ASSESSME	NT:					
(CRITICAL FLIGH		REDUN	DANCY SO	CREENS	CIL ITEM
	HDW/FU	NC	A	В	С	***
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LEAD ANA	LYS	ST	:											
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REMARKS: FORWARD CHANGE I							LVE #5 ESSMEN'							

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SUBSYSTI MDAC ID: ITEM:				FRCS 657 DIODE						1 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
LEAD ANA	ALY	ST	:											
ASSESSMI	ENT	:												
	CR		ICAL LIGH		RI	EDUND	ANCY	SCREE	ens			CIL		
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NASA IOA	[3	/ /3]	[]]]	[]		[]	*
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REMARKS: FORWARD	MA													

ASSESSME ASSESSME NASA FME	NТ	I		FR	CS−€	558						DATA: LINE NEW	[]
SUBSYSTEMDAC ID:	M:			FR 65 DI								,		‱ <u> </u>
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NASA IOA	[3	/3]		[]	. [[]	[]]] *
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RECOMMEN	DA'	ΓI	ons:		(If	dif	fere	nt fr	om N	ASA)				
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* CIL RE	TE	NT	ION	RAT	IONZ	ALE:	(If	appl	icab		ADEQU ADEQU		[]
REMARKS: FORWARD CHANGE I						rion See	VAI ASSE	VE #5	RE-	ANAL S FR	YZED CS 11	BY IC)A -11	DUE TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-659			•	1	NASA BASE		[]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 659 DIODE								
LEAD ANALYST:									
ASSESSMENT:									
CRITICAL FLIGH	T	REDUND		SCREE				CIL ITEN	4
HDW/FU	NC A	Y	В		C	-			
NASA [/ IOA [3 /3] []	[]]]		[] *]
COMPARE [N /N] []	Ţ]	[]		[J
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REMARKS: FORWARD MANIFOLD CHANGE IN CIRCUIT		VALVI ASSESS							

REPORT DATE 2/26/88

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SUBSYSTEM MDAC ID: ITEM:	[:			FR 66 DI																
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ASSESSMEN	T:																			
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COMPARE	[N	/N]		[N]]	N]	[N	[]			[]	
RECOMMEND	ľAC	ľI	ons:		(If	d:	ifi	fer	ent	f	ro	m	NASA	.)	-					
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REMARKS: FORWARD N CHANGE IN	IAN) V	NI: CII	FOLD RCUI	IS TRY	SOLAT	ri SE:	ON E 2	VA ASS	LVE ESS	MI	‡5 ENT	RE	-ANA	Ľ	ZED	ВУ	I	DA I	DUE	TO X.

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SUBSYSTIMDAC ID:				FRCS 661 DIODE												
LEAD AND	ALY	ST	:													
ASSESSMI	ENT	:														
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NASA IOA	[3	/ /2R]]	F]	[P]	[P]		[] *]
COMPARE	[N	/N	3	[N]	[N]	[N	j		[&a	4680H]
RECOMMEN	IDA!	ric	ons:	(If	đ:	if1	fere	nt	fr	om NA	SA))				
	(/ ·]	[]	[j	[j	(AD	[D/D] ELETE)
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REMARKS: FORWARD CHANGE 1	MAI										IAV	ĽΥ:	ZED E	BY IO	A D	UE TO

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-66	12						ASA D BASEL		[]	
SUBSYSTEM: MDAC ID: ITEM:	FRCS 662 DIODE										. <u>-</u>	
LEAD ANALYST:												
ASSESSMENT:												
CRITICAI FLIGH HDW/FU	T	RI A		ANCY B	SCRE	ENS	s C			CIL		
NASA [/ IOA [3 /2F] [P]	[[P]]	P]	•	[]	*
COMPARE [N /N] [N]	[N]	Į	N]	·	[]	-
RECOMMENDATIONS:	(If d	ifí	feren	t fr	om NAS	SA))					
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* CIL RETENTION REMARKS: FORWARD MANIFOLD	ISOLATI	ON	VALVI	E #5	RE-AN	II IAI	IAI LYZ		TE Y IC			
CHANGE IN CIRCUI	TRY. SE	E A	ASSESS	SMEN	T IDs	FF	CS	110	01X-	110	79X	

ASSESSMENT D ASSESSMENT I NASA FMEA #:		S-663		BASELINE NEW	[]	÷ .
SUBSYSTEM: MDAC ID: ITEM:	FRC 663 DIC			- · · · · · · · · · · · · · · · · · · ·		
LEAD ANALYST	':					
ASSESSMENT:						
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NASA (IOA (3	/] /2R]	[F]	[] [P]	[] [P]	[]	*
COMPARE [N	[и\ 1	[N]	[и]	[N]	[]	
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* CIL RETENT	CION RATI	CONALE: (If	applicabl	e) ADEQUATE INADEUATE	[]	
REMARKS: FORWARD MANI CHANGE IN CI	FOLD ISC	CLATION VAL	VE #5 RE-A SSMENT IDs	NALYZED BY I FRCS 11001X	OA DUE -11079	ТО Х.

ASSESSME ASSESSME NASA FME	NT ID:	FRCS-	664				N	IASA I BASEI		[]	
SUBSYSTE MDAC ID:	M:	FRCS 664 DIODE									e en i	
LEAD ANA	LYST:								٠	. بد د		
ASSESSME	NT:											
	CRITICA:		R	EDUN	DANCY	SCR	EENS			CI		
	HDW/F	JNC	A		В		C	2				
NASA IOA	[3 /3]	[[]	[]	[] .]]	*
COMPARE	[N /N	1	[]	[]	[]		[]	
RECOMMEN	DATIONS	: (If	dif	fere	nt fr	om N	ASA)					
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* CIL RE	TENTION	RATION	ALE:	(If	appl	icab	I	ADEQU.]	
REMARKS: FORWARD CHANGE I			TION SEE	VAL ASSE	VE #5	RE-	ANALY	ZED S 11	BY IC)A -11	DUE '	го •

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SUBSYSTI MDAC ID: ITEM:				FRCS 665 DIODE	!									
LEAD AND	ALY	ST	:											
ASSESSMI	ENT	:												
	CR			ITY	F	REDUN	DANCY	SCI	REENS			CII		
	٠.		LIGH W/FU		A		В		(3	un e	ITE	EM.	
NASA IOA	[3	/ /3]	[]	[]	[[]		[]	*
COMPARE	[N	/N]	[]	[]	[]		[]	
RECOMMEN	VDA'	TI	ONS:	(If	dif	fere	nt fro	om 1	IASA)					
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FORWARD CHANGE	MA						VE #5							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-	566				r	BASEL		[]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 666 DIODE								T.Pa.	-
LEAD ANALYST:										
ASSESSMENT:										
CRITICAI FLIGH		R	EDUNI	DANCY	SCRI	EENS			CIL	
HDW/FU		A		P	3	(2	-		•
NASA [/ IOA [3 /3]	[].	ľ ľ]	[]		[] *
COMPARE [N /N]	[1,	[]	Ε]		[]
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REMARKS: FORWARD MANIFOLI CHANGE IN CIRCUI		TION SEE	VALV ASSES	/E #5 SSMEN	RE-	ANALY	YZED B CS 110	Y IC	OA D -110	UE TO 79X.

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LEAD ANA	LY	ST	:											
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	CR:		ICAL LIGH		I	REDUN	DANCY	SCF	REENS			CIL		
	1		W/FU		7	Ā	E	3	-	C	-	ITE	MI.	
NASA IOA	[[3	/ /3]	[]	[]	[]		[]	* .
COMPARE	[N	/N]	[]	[]	[]		[]	
RECOMMEN	DA'	ΓΙ	ONS:	(I:	f di	fere	nt fr	om N	IASA)					
	[-]	[]	[]	[]	(AE	[D/DI] ELE	CTE)
* CIL RE	TEI	YT:	ION	RATIO	VALE:	(If	appl	icab		ADEQU <i>I</i>	ים ייי	г	1	
DEWARKS -					-					ADEQUA		[]	
REMARKS:	MAI	uT:	FOT.D	TSOL	אידרא	T WAT	VE #5	RE-	ANAT	YZED F	RV TO	זרו ב	TE:	ጥር

CHANGE IN CIRCUITRY. SEE ASSESSMENT IDS FRCS 11001X-11079X.

667

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	: 1/29/88 FRCS-668 05-6KF-2208 -1	NASA DAT BASELIN NE	- ·								
SUBSYSTEM: MDAC ID: ITEM:	FRCS 668 DRIVER, HYBRID										
LEAD ANALYST:	D. HARTMAN										
ASSESSMENT:		•									
CRITICA: FLIG	LITY REDUNDA	ANCY SCREENS	CIL ITEM								
HDW/F											
NASA [2 /1] IOA [3 /3	R] [P]	[F] [P] [] []	[X] *								
COMPARE [N /N] [N]	[и] [и]	[N]								
RECOMMENDATIONS	: (If differen	t from NASA)									
[3 /2]	R] [P]	[P] [P]	[D] ADD/DELETE)								
* CIL RETENTION	RATIONALE: (If										
ADEQUATE [] INADEQUATE [] REMARKS: NASA FMEA CONSIDERS MULTIPLE FAILURES. HOWEVER, IF DRIVER FAILS OPEN, LOSE CAPABILITY TO MONITOR VALVE STATUS WITH THE SWITCH TALKBACK. MDM DISCRETES PROVIDE REDUNDANCY. LOSS OF THIS REDUNDANCY MAY LEAD TO FALSELY FAILING THE VALVE CLOSED, POSSIBLY EFFECTING MISSION OPERATIONS.											
AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.											

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	EDCC-660	9 2208 -2		NASA DATA: BASELINE NEW						
	FRCS 669 DRIVER,	HYBRID								
LEAD ANALYST:	D. HARTI	IAN								
ASSESSMENT:										
		REDUNDAN	CY SCREENS	5	CIL					
	CRITICALITY REDUNDANCY SCREENS FLIGHT HDW/FUNC A B C									
NASA [3 /1R IOA [2 /1R] [P] [P]	P] [F] [P] P]	[X] *					
COMPARE [N /] [] [N] []	[и]					
RECOMMENDATIONS:	(If di	fferent	from NASA)						
[2 /1R] [P] [P] [[A] D/DELETE)					
* CIL RETENTION F	RATIONALI	E: (If ap	- 	ADEQUATE NADEQUATE	[]					
REMARKS: LOSE CAPABILITY T LOSS OF HARDWARE EXPEL PROPELLANTS	REDUNDAN	ICY MAY C	VALVE.	THIS COUPLE OF JETS RE	D WITH THE QUIRED TO					

CLOSED MANIFOLD 1-4 ISOLATION VALVE.

ISSUE IS TIED TO THE IOA HARDWARE CRITICALITY FOR THE FAILED

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-670 05-6KF-2208 -1	NASA DAT. BASELIN NE										
SUBSYSTEM: MDAC ID: ITEM:	FRCS 670 DRIVER, HYBRID											
LEAD ANALYST:	D. HARTMAN											
ASSESSMENT:			-									
CRITICAL FLIGH	ITY REDUNDAN	CY SCREENS	CIL ITEM									
	NC A	В С	1,1011									
NASA [2 /1R IOA [3 /3] [P] [F] [P]	[X] * []									
COMPARE [N /N] [и] [и] [и]	[N]									
RECOMMENDATIONS:	(If different	from NASA)										
[3 /2R] [P]] [P] [P] (2	[D] ADD/DELETE)									
* CIL RETENTION	RATIONALE: (If app	TOTALIA	[]									
REMARKS: NASA FMEA CONSIDERS MULTIPLE FAILURES. HOWEVER, IF DRIVER FAILS OPEN, LOSE CAPABILITY TO MONITOR VALVE STATUS WITH THE SWITCH TALKBACK. MDM DISCRETES PROVIDE REDUNDANCY. LOSS OF THIS REDUNDANCY MAY LEAD TO FALSELY FAILING THE VALVE CLOSED, POSSIBLY EFFECTING MISSION OPERATIONS.												
DISCUSSED. IT W	T MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS ISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS UE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE SSUE REMAINS OPEN.											

ASSESSMEN ASSESSMEN NASA FME	I TV	: 05-6KF-2208 -2													DA ELI N	NE]
SUBSYSTEM MDAC ID: ITEM:	M:		FRC: 671 DRI		.,	Н	BR)	D										
LEAD ANA	LYST	:	D. 1	HAR	TM	IAI	ī											
ASSESSME	NT:																	
(F	ICAL: LIGH' W/FUI	r			RI A	EDUN	IDA	NC	EY B	sc	REEN	s c				CII	
		•																•
NASA IOA	[3	/1R /3] .		[P]	-]	P]	[P]			[] *
COMPARE	[/N]		[N]		[N]	[N]			[]
RECOMMEN	DATI	ons:	(Ιf	di	fí	ere	ent	. 1	fro	m	NASA)					
	[/]		[]		[]	[]		(AI	[DD/E] ELETE)
* CIL RE	TENT	ION 1	RATI(ANC	LE	E :	(II	£ a	pr) 11	ica				UAT UAT		[]
REMARKS:	ES W	ITH 1	NASA	FM	Œ₽	١.												

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-672 05-6KF-2208 -1	NASA DATA: BASELINE [] NEW [X]							
SUBSYSTEM:									
LEAD ANALYST:	D. HARTMAN								
ASSESSMENT:									
CRITICAL FLIGH	ITY REDUNDANCY SCREENS	CIL ITEM							
HDW/FU	NC A B	С							
NASA [2 /1R IOA [3 /3	[P] [F] [P] [X] *							
COMPARE [N /N] [N] [N] [N] [N]							
RECOMMENDATIONS:	(If different from NASA)								
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* CIL RETENTION	RATIONALE: (If applicable)	ADEQUATE [] NADEQUATE []							
OPEN, LOSE CAPAB TALKBACK. MDM D	ERS MULTIPLE FAILURES. HOW ILITY TO MONITOR VALVE STAT ISCRETES PROVIDE REDUNDANCY EAD TO FALSELY FAILING THE	VEVER, IF DRIVER FAILS TUS WITH THE SWITCH Y. LOSS OF THIS							
DISCUSSED. IT W	SUBSYSTEM MANAGER ON 1/20/8 AS AGREED UPON THAT THE ISS INTERPRETATIONS OF NSTS 22 EN.	SUE RAISED ABOVE WAS							

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-673 05-6KF-2	3 2208 - 2				ASA DATA BASELINE NEW					
	FRCS 673 DRIVER,										
LEAD ANALYST:	D. HARTM	IAN									
ASSESSMENT:											
CRITICAL: FLIGH		REDUNDA	NCA				CIL ITEM				
HDW/FU	1C	A	В		С	en i en e <mark>d</mark> en ende					
NASA [3 /1R IOA [2 /1R] [P] P]	[P [F]	[P [P]	[x]	*			
COMPARE [N /] []	[N]	[]	[N]				
RECOMMENDATIONS:	(If di	ifferent	fro	om NAS	A)						
[2 /1R] [P j	[P]	[P] (AI	[A] DD/DEI				
* CIL RETENTION	RATIONALE	E: (If a	ppli								
					IA INAI	DEQUATE DEQUATE	[]				
REMARKS: LOSE CAPABILITY TO OPEN ISOLATION VALVE. THIS COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET CG LIMITS.											
TESTIF IS TIFD TO								.ED			

CLOSED MANIFOLD 1-4 ISOLATION VALVE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	ATA: INE [] NEW [X]		
SUBSYSTEM: MDAC ID: ITEM:	FRCS 674 DRIVER, HYBRID		
LEAD ANALYST:	D. HARTMAN		
ASSESSMENT:			·
CRITICAL FLIGH	ITY REDUND. T	ANCY SCREENS	CIL ITEM
	NC A	В С	
NASA [2 /1R IOA [3 /3] [P]] []	[F] [P] [] []	[X] * []
COMPARE [N /N] [N]	[иј [иј	[N]
RECOMMENDATIONS:	(If differen	t from NASA)	
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OPEN, LOSE CAPAB TALKBACK. MDM D	ILITY TO MONITO ISCRETES PROVIDE EAD TO FALSELY	ILURES. HOWEVER, I R VALVE STATUS WITH E REDUNDANCY. LOSS FAILING THE VALVE (IF DRIVER FAILS H THE SWITCH S OF THIS
DISCUSSED. IT W	AS AGREED UPON ' INTERPRETATION	ER ON 1/20/88, NSTS THAT THE ISSUE RAIS S OF NSTS 22206.	SED ABOVE WAS

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SUBSYSTI MDAC ID: ITEM:				67	RCS 75 RIVEI	α,	H?	YBR	lD													
LEAD AN	ALÝ:	ST	:	D.	HAI	RTI	IAN	N.														
ASSESSMI	ENT	:																				
		F	ICAL: LIGH' W/FU	Г	-		RI A		NDZ	ANG	CY B		REE	NS	s C				CI	L EN	1	
NASA IOA	[[3	/1R /3]]	P]		[P]		[P]]]	*
COMPARE	[/N]		[N]		[N]		[N]			[]	
RECOMME	NDA!	ΓI	ons:		(If	đ:	ifi	fer	ent	: :	fro	o m	NAS	A))							
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* CIL R		NT:	ION 1	RAT	TION	ΑL	Ε:	(I	fa	apı	91 i	Lca	ble				UATE UATE		[]	

IOA AGREES WITH NASA FMEA.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	NASA DATA: BASELINE [] NEW [X]		
SUBSYSTEM: MDAC ID: ITEM:	FRCS 676 DRIVER, HYBR	ID	
LEAD ANALYST:	D. HARTMAN		
ASSESSMENT:			
CRITICAL FLIGH	CIL ITEM		
	NC A	В	
NASA [2 /1R IOA [3 /3] [P]] []	[F] [[] [P] [X] *
COMPARE [N /N] [N]	[N] [и] [и]
RECOMMENDATIONS:	(If differ	ent from NASA)	
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OPEN, LOSE CAPAB TALKBACK. MDM D	ILITY TO MONI ISCRETES PROV EAD TO FALSEL	FAILURES. HOW TOR VALVE STAT IDE REDUNDANCY Y FAILING THE	EVER, IF DRIVER FAILS US WITH THE SWITCH
DISCUSSED. IT W	AS AGREED UPO INTERPRETATION	N THAT THE ISS	8, NSTS 22206 WAS UE RAISED ABOVE WAS 206. THEREFORE, THE

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-677	08 -2		NASA DATA BASELINE NEW	
MDAC ID:	FRCS 677 DRIVER, HY	'BRID			
LEAD ANALYST:	D. HARTMAN	4			
ASSESSMENT:					
CRITICALI FLIGHT	1		Y SCREEN		CIL ITEM
HDW/FUN	IC A	1	В	C	
NASA [3 /1R IOA [2 /1R] [P] []	P] [F] [P] P]	[x] *
COMPARE [N /] [] []	и] []	[N]
RECOMMENDATIONS:	(If diff	ferent f	rom NASA)	
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* CIL RETENTION R	RATIONALE:	(If app	•	ADEQUATE NADEQUATE	[]
REMARKS: LOSE CAPABILITY T LOSS OF HARDWARE EXPEL PROPELLANTS	REDUNDANCY TO MEET C	MAY CAT	VALVE. T USE LOSS	THIS COUPLI	ED WITH THE EQUIRED TO
ISSUE IS TIED TO CLOSED MANIFOLD 1				TY FOR THE	E FAILED

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	NASA DATA: BASELINE NEW	: [x]	
SUBSYSTEM:			
LEAD ANALYST:	D. HARTMAN		
ASSESSMENT:			
CRITICAL FLIGH	ITY REDUNDANC	CY SCREENS	CIL ITEM
	NC A	В С	
NASA [2 /1R IOA [3 /3	[P] [] [] [F] [P] []	[X] *
COMPARE [N /N] [N] [и] [и]	[N]
RECOMMENDATIONS:	(If different f	from NASA)	
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* CIL RETENTION	RATIONALE: (If app	plicable)	r 1
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OPEN, LOSE CAPAB TALKBACK. MDM D	ILITY TO MONITOR VISCRETES PROVIDE FEAD TO FALSELY FA	URES. HOWEVER, IF INVALVE STATUS WITH THE REDUNDANCY. LOSS OF ILING THE VALVE CLOSE	HE SWITCH F THIS
DISCUSSED. IT W	AS AGREED UPON THAT INTERPRETATIONS O	ON 1/20/88, NSTS 22 AT THE ISSUE RAISED OF NSTS 22206. THE	ABOVE WAS

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-679 05-6KF-22	08 -2	1	NASA DATA: BASELINE NEW	[X]
	FRCS 679 DRIVER, H	YBRID				
LEAD ANALYST:	D. HARTMA	Ŋ				
ASSESSMENT:						
CRITICALI FLIGHT		EDUNDANCY			CIL ITEM	
HDW/FU	IC A	В	(C		
NASA [3 /1R IOA [3 /3] [P] [P] []	P]	[.] *]
COMPARE [/N] [N] [N] [1	4]	ξ]
RECOMMENDATIONS:	(If dif:	ferent fro	om NASA)			
[/] [] [] . [] (AE	[DD/DE] LETE)
* CIL RETENTION F	RATIONALE:	(If appl:	Z	ADEQUATE ADEQUATE	[]
IOA AGREES WITH N	NASA FMEA.				•	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	NT DATE: 1/29/88 NASA DATA NT ID: FRCS-680 BASELINE A #: 05-6KF-2208 -1 NEW M: FRCS							
SUBSYSTEM: MDAC ID: ITEM:	FRCS 680 DRIVER, HYBRID							
LEAD ANALYST:	D. HARTMAN							
ASSESSMENT:								
FLIGH		NCY SCREENS	CIL ITEM					
HDW/FU	NC A	В С						
NASA [2 /1R · IOA [3 /3] [P]] []	[F] [P] [] []	[X] *					
COMPARE [N /N] [N]	[и] [и]	[N]					
RECOMMENDATIONS:	(If different	from NASA)						
[3 /2R] [P]		[D] DD/DELETE)					
* CIL RETENTION	RATIONALE: (If a	pplicable) ADEQUATE INADEQUATE						
OPEN, LOSE CAPAB	ILITY TO MONITOR ISCRETES PROVIDE EAD TO FALSELY F.	LURES. HOWEVER, IF I VALVE STATUS WITH TO REDUNDANCY. LOSS OF AILING THE VALVE CLOS	DRĪVĒR FAĪLS HE SWITCH F THIS					
DISCUSSED. IT W	AS AGREED UPON T INTERPRETATIONS	R ON 1/20/88, NSTS 2: HAT THE ISSUE RAISED OF NSTS 22206. THE	ABOVE WAS					

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-681 NASA FMEA #: 05-6KF-2							08 - 2							ASA DATA BASELINE NEW	[]		
SUBSYSTE MDAC ID:	M:			681	FRCS														
LEAD ANA	LY	ST	:	D. HAI	RTI	IAN	1												
ASSESSME	TN	:																	
CRITICALITY REDUNDANCY FLIGHT									SCF	REE	NS	3			IL PEN				
HDW/FUNC									В				С		1.	rei	1		
NASA IOA	[3 2	/1R /1R]]	P P]	[P].		[P P]	[X]	*	
COMPARE	[N	/]	[]	[N]		[]	[N]		
RECOMMEN	'DA'	ΓI	ons:	(If	d :	ifi	ferent	t :	fro	om N	IAS	A)							
	[2	/1R]	[P]	[P]	•	[P] ELE	TE)	
* CIL RE	TE	NT:	ION I	RATION	ΑLI	Ξ:	(If a	ap	pl:	icab		•	ÀΙ	DEQUATE	[]		
INADEQUATE [] REMARKS: LOSE CAPABILITY TO OPEN ISOLATION VALVE. THIS COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET CG LIMITS.																			
ISSUE IS TIED TO THE IOA HARDWARE CRITICALITY FOR THE FAILED CLOSED MANIFOLD 1-4 ISOLATION VALVE.																			

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-682 05-6KF-2208 -1	NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID:	FRCS 682 DRIVER, HYBRID		
LEAD ANALYST:	D. HARTMAN		-
ASSESSMENT:	•		
CRITICALI FLIGHT	TY REDUNDANC	CY SCREENS	CIL ITEM
		В С	IIDM
NASA [2 /1R IOA [3 /3	[P] [[P] [F] [P]	[X] *
COMPARE [N /N] [и] [и] [и]	[N]
RECOMMENDATIONS:	(If different f	rom NASA)	
[3 /2R] [P] [[D] DD/DELETE)
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		ADEQUATE INADEQUATE	
OPEN, LOSE CAPABITALKBACK. MDM DIS	LITY TO MONITOR V SCRETES PROVIDE R AD TO FALSELY FAI	RES. HOWEVER, IF ALVE STATUS WITH T EDUNDANCY. LOSS O LING THE VALVE CLO	DRIVER FAILS HE SWITCH F THIS
DISCUSSED. IT WAS	S AGREED UPON THA INTERPRETATIONS O	ON 1/20/88, NSTS 2 T THE ISSUE RAISED F NSTS 22206. THE	ABOVE WAS

	NT	II		1/29/88 FRCS-683 05-6KF-2208 -2											[]					
SUBSYSTE MDAC ID:	М:			FR 68 DR		۲,	H7	/BR	ID											
LEAD ANA	LYS	ST	;	D.	HAI	RTI	IAN	1												
ASSESSME	NT:	:																	•	
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	F		/FU				A				В			(2					
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COMPARE	[/N]			N]		[N	1	(1	1]			[]	
RECOMMEN	DA?	ΓI	ons:		(If	d :	if	fer	ent	: 1	fro	m	NASA	۲)						
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REMARKS:	ES	W	ITH :	NAS	A FI	ME.	Α.									•				

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SUBSYSTE MDAC ID:	M:			FRCS 684 DRIVE	ER, H	YBRI	D							*
LEAD ANA	LYS	T:												
ASSESSME	NT:													
	CRI		CAL		R	EDUN	DANCY	SCR	EENS			CI	L	
	H		/FUI		A		В		(C				
NASA IOA	[[3	/ /3]	[]	[]] []]]	*
COMPARE	[N	/N	1	[]	[]	[]		[]	
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٠.	[/]	[]	[]	[]	(AI	[DD/	DEL	ETE
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REMARKS: FORWARD CHANGE I							VE #5 SSMEN							

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SUBSYSTE MDAC ID: ITEM:				FRCS 685 DRIVER	۲,	H	YBRII)						1	ili.					
LEAD ANA	LY	ST	:																	
ASSESSME	NT	:									_									
		F	LIGH'	ITY T NC						CY B		CREI	ENS	s C			CI	L EM		
N3 C3											,		r		,		r		7	4
NASA IOA	[3	/2R]	[P]		[P]		[P]		[]	•
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REMARKS: FORWARD CHANGE I													IAI	LYZ	ZED	BY I	OA	DU:		

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-68	6						A DATA SELINE NEW	[]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 686 DRIVER,	Н	BRID							
LEAD ANALYST:										
ASSESSMENT:										
CRITICAL		RI	EDUNDA	NCA	SCREE	ns			CIL	
FLIGH HDW/FU		A		В			С		TIL	
NASA [/ IOA [3 /2R] [P]	[[P]	[P _.]] [] *]
COMPARE [N /N] [N]	[N]	[N]		[]
RECOMMENDATIONS:	(If d	ifi	ferent	: fr	om NAS	SA)				-
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* CIL RETENTION	RATIONAL	E:	(If a	ppl	icable			QUATE QUATE	[]
REMARKS: FORWARD MANIFOLD CHANGE IN CIRCUI								D BY I 11001X		

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SUBSYSTE MDAC ID:				FRCS 687 DRIVE	R, E	IYBRID)						
LEAD ANA	LY	ST	:										
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	CR			ITY	F	REDUNE	ANCY	SCRE	ENS			CIL	
	1		LIGH!		A		В	}	(C		ITEN	1
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FORWARD													

ASSESSME ASSESSME NASA FME	NT	II		FRCS-	-68	В							-	ASA BASE	LIN	ΙE	[]	
SUBSYSTEMDAC ID:	М:			FRCS 688 DRIVE	ER,	H	/BRI	D												
LEAD ANA	LY	ST	:																	
ASSESSME	NT	:																		
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COMPARE	[N	/N]	[N]	[N	.]]	[N]			[]	
RECOMMEN	DA'	ΓΙ	ons:	(If	đ	ifi	fere	ent	fr	OI	n NAS	A)								
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REMARKS: FORWARD CHANGE I											RE-AN IDs									

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SUBSYST				FRCS 689 DRIVE	R, H	IYBRI	D						
LEAD AN	ALY	SŤ	:										
ASSESSM	ENT	:											
	CR		ICAL LIGH		F	REDUN	DANCY	SCR	EENS		CIL		
	1			NC	A		. E	3	(2	115	M	
NASA IOA	[[3	/3]	[]	[]	[]	[]	*
COMPARE	ſ	N	/N]	[]	[]	[]	[]	
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REMARKS FORWARD CHANGE	MA												

ASSESSME ASSESSME NASA FME	NT	II		FRCS-6	590					NASA I BASEI		[]	-
SUBSYSTEMDAC ID:	M:			FRCS 690 DRIVE	R, H	YBRID								
LEAD ANA	LYS	T:												
ASSESSME	NT:	:												
,	CRI			[TY	R	EDUND	ANCY	SCRE	ens			CIL	AF.	
	F		LIGH' /FUI		A		В			С		TTE	1	
NASA IOA	[3	/ /3]	[]	[]	[]		[]	*
COMPARE	[N	/N]	[]	[]	[]		[]	
RECOMMEN	DAT	CIC	NS:	(If	dif	feren	t fr	om NAS	SA)					
	[/]	[]	[]	[]	(AI	[·		ETE)
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REMARKS: FORWARD CHANGE I										YZED E				

ASSESSMEN NASA FME	NT I	D:	FRCS-	-691				r		LINE	[]
SUBSYSTEMDAC ID:	M:		FRCS 691 DRIVE	ER, H	IYBRI	D			truk. 1			
LEAD ANA	LYSI	:										
ASSESSME	NT:											
,	F	LIGH	ITY T NC			DANCY B	SCR		3	 	CII	
NASA IOA	[3	/3]	[]	[]]]		[] *
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* CIL RE		MOI	RATION	IALE:	(If	appl	icab	P	DEQU	ATE ATE	[]
REMARKS: FORWARD I CHANGE I	MANI											

ASSESSME ASSESSME NASA FME	NT	I		FRC	S-692				ħ	IASA BASE		[]	
SUBSYSTE MDAC ID:				FRC 692 DRI	s VER, H	YBRI	ID.							
LEAD ANA	LY:	ST	:											
ASSESSME	NT	:												
	CR:		ICAL LIGH		R	EDUN	IDANCY	SCF	REENS			CII		
]		W/FU		A		В		Ċ	2				•
NASA IOA	[[3	/ /3]	[]	[]	[]]] *	t
COMPARE	[N	/N]	[]	[]	[]		[]	
RECOMMEN	DA!	ri	SMC:	(If dif	fere	ent fro	om N	IASA)					
	[/ .]	[]	[]	[]	(. A .)	[DD/I] DELEI	ľΕ
* CIL RE	TE	NT:	ION	RATI	ONALE:	(Ii	appl	lcab		DEOU	አ ጥፑ	r	ר	
REMARKS:									INA	DEQUA DEQUA	ATE	[]	
FORWARD CHANGE I	MA						LVE #5 ESSMENT							

ASSESSMENT DATE:						ASA D			
ASSESSMENT ID: NASA FMEA #:	FRCS-693					BASEL:	NEW	_]
	FRCS 693 DRIVER, H	IYBRID							
LEAD ANALYST:									
ASSESSMENT:									
CRITICAL FLIGH		REDUNDA	NCY	SCREE	ens			CIL	J.
HDW/FU		.	В		С			1151	1
NASA [/ IOA [2 /2] []	[]	[]		x]] *
COMPARE [N /N] []	[]	[]		[N]
RECOMMENDATIONS:	(If dif	ferent	fro	m NAS	iA)				
[/] [1	[]	[]	(AD	[D/DI] ELETE)
* CIL RETENTION	RATIONALE:	(If a	ppli	.cable	A	DEQUA' DEQUA'		[]
REMARKS: FORWARD MANIFOLD CHANGE IN CIRCUIT									

ASSESSME ASSESSME NASA FME	'nТ	I		FRCS-	-694]	NASA BASE	DATA: LINE NEW	[]	
SUBSYSTE MDAC ID:				FRCS 694 DRIVE	ER, H	IYBRI	D							
LEAD ANA	LY	ST	:											
ASSESSME	'nТ	:												
	CR		ICAL LIGH		F	REDUN	IDANCY	SCR	EENS			CII		
			W/FU		A	7	В		(C		***	31.1	
NASA IOA	[3,	/ /3]	[]	[[]	[.]		[[]	*
COMPARE	[N	/N]	[]	[]	[3		[]	
RECOMMEN	ΙDΑ	TI	ons:	(11	dif	fere	ent fro	om N	ASA)					
	[/	3	[]	[]	[]	(AI	[DD/I) DELE	TE)
* CIL RE	TE	NT:	ION	RATION	NALE:	(If	appl	icab		ADEQU ADEQU]	
REMARKS: FORWARD CHANGE I	MA						VE #5 SSMEN		ANAL	YZEĎ	BY I) A I	UE	

ASSESSMENT DATE ASSESSMENT ID: NASA FMEA #:	FRCS-69	5			N	IASA DATA BASELINE NEW	E []
SUBSYSTEM: MDAC ID: ITEM:	FRCS 695 DRIVER,	HYBRID)			·· ·· ·		*
LEAD ANALYST:								
ASSESSMENT:								
CRITICA FLIG		REDUNE	ANCY	SCREE	ins		CIL	
HDW/H		A	В		C	:	I I II	м
NASA [/ IOA [3 /3] []]]	[[]	[] *]
COMPARE [N /N] []	[]	[]	[]
RECOMMENDATIONS	: (If d	lifferen	it fro	om NAS	A)			
[/] []	[]]] (A	[.DD/D] ELETE)
* CIL RETENTION	RATIONAL	E: (If	appli	cable	À	DEQUATE	[]
REMARKS: FORWARD MANIFOI CHANGE IN CIRCU								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-696 05-6KF-20	005 -1				ASA DATA BASELINE NEW	[]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 696 FUSE,1A					·		
LEAD ANALYST:	D. HARTMA	AN						
ASSESSMENT:								
CRITICAL FLIGH		REDUNDA	ANCY	SCREE	ENS		CII	
HDW/FU	NC A	A	В		С			
NASA [3 /1R IOA [3 /1R] []	?] ?]	[P]	[P]	[] *]
COMPARE [/] [j	[]	[]	[]
RECOMMENDATIONS:	(If dif	fferent	t fro	om NAS	SA)			
[/] []	[]	[] (A	[DD/E] ELETE
* CIL RETENTION	RATIONALE:	: (If a	appli	icable	A	DEQUATE DEQUATE	[[] .
REMARKS: NO DIFFERENCES.								

ASSESSMEN ASSESSMEN NASA FME	NΤ	II):	FF	CS-6	59.	7 200)5	-1					N		A DA SELI N			x]	
SUBSYSTEM MDAC ID: ITEM:	M:			69	RCS 7 ISE, I	LΑ					•									
LEAD ANA	LYS	T:		D.	HAI	(T)	IAN	1												
ASSESSME	NT:									•										
•			CAL LIGH		•		RI	EDU	ND.	AN	CY	sc	REEN					CI		
	H	DW	/FUI	NC.			A				В			C	2					
NASA IOA	[[3 3	/1R /1R]		[P P]		[P P]		F))			[]	*
COMPARE	[/]		[]		[]	[]			[]	
RECOMMEN	DAT	'IC	NS:		(If	d:	ifi	fer	en	t :	fr	om	NASA	(۱						
	[/,]		[]		[]	(]		(AI		DELI	ETE)
* CIL RE	ren	ΤI	ON I	RAI	'ION?	L	Ξ:	(I	f	ap	pl:	iça	·	2	ADE	QUAT QUAT	'E 'E	[]	
REMARKS: NO DIFFE	REN	CE	ES.															-	-	

ASSESSME ASSESSME NASA FME	NT	I		FF	(29/8 RCS-6 S-6K)	69)5 ·	-1							ASA BAS	EL]		C	[x]		
SUBSYSTE MDAC ID:	M:			69	RCS 8 JSE,:	1A																		
LEAD ANA	LYS	ST	:	D.	HAI	RTI	IAN	N.																
ASSESSME	NT:	:																						
		F	ICAL	Г	?			EDU	NDA	NO		sc	REE	NS						CI II	L	ī		
	ì	IDI	W/FUI	NC			Α				В				С									
NASA IOA]	3 3	/1R /1R]		[P P]]	P P]]	P P]]]	*	
COMPARE	[/]		[]		[]		[]				[J		
RECOMMEN	DA"	ΓΙC	ons:		(If	d :	if:	fer	ent	: 1	fro	om	NAS	A)										
	(/	1		[]		[j		[]		(2	ΔD	[D/	DE] ELI	ETE	2
* CIL RE	TEI	T.	ION 1	RAT	NOI	AL	E:	(I	f a	pp	1:	ica				DEQ DEQ]]		
REMARKS:																								

NO DIFFERENCES.

ASSESSMEI ASSESSMEI NASA FME	NT I	D:	1/29/ FRCS- 05-6K	699	05 -	1			DATA ELINE NEW]
SUBSYSTEM MDAC ID: ITEM:	M:		FRCS 699 FUSE,	1A							
LEAD ANA	LYSI	?:	D. HA	RTMA	N						
ASSESSME	NT:										
(CAL		R	EDUN	DANCY	sc.	REENS		CIL	
		'LIGH' W/FU		A		F	3	_ C		ITE	M.
NASA IOA	[3	/1R /1R]	[P]	[] []	?]	[P] [P]		[] *
COMPARE	[/]	[]	[]	[]		[]
RECOMMEN	DATI	ONS:	(If	dif	fere	nt fr	com 1	IASA)			
	[/]	[]	[]	[]	(Al	[D/D] ELETE)
* CIL RET	rent	ION	RATION	ALE:	(If	app]	licab		JATE JATE	[]
NO DIFFE	RENC	ES.									

ASSESSME ASSESSME NASA FME	NT	I		FRCS-	700]	NASA BASE	DATA: LINE NEW]	
SUBSYSTE MDAC ID:				FRCS 700 FUSE,	1A									
LEAD ANA	LY	ST	:											
ASSESSME	'nТ	:												
	CR		ICAL LIGH	ITY T	R	EDUNE	ANCY	SCREE	ens			CI		
]	HDI	W/FU	NC	A		В		(С				
NASA IOA	[3	/ /3]	[]]	[]	[]]]	*
COMPARE	[N	/N	1	[]	[]	[]	-	[]	
RECOMMEN	IDA'	ri(ONS:	(If	dif:	ferer	nt fro	om NAS	SA)					
	[/ `]	[3	[]	[]	(Al	[DD/1	DEL.	ETE
* CIL RE		NT:	ION	RATION	ALE:	(If	appli	icable		ADEQU ADEQU	ATE ATE	[]	
REMARKS: FORWARD CHANGE I	MA							RE-AN						

ASSES ASSES NASA	SSMI	ENT	'I		FR	cs-70	1									DATA: ELINE NEW	[]	-
SUBS' MDAC ITEM	ID:				FR 70 FU														
LEAD	ANA	\LY	ST	:															
ASSES	SSMI	ENT	':																
			F	ICAL: LIGH' W/FUI	r		R:		NDA	NC	EY B	SCI	REENS	c			CII		
N.	ASA IOA	[3	/ /2R]	[P]		[P]	[P]		[]	*
COMP	ARE	[N	/N]	(N]]	N]	[N]		[]	
RECO	MME	1DA	TI	ons:		(If d	if	fer	ent	f	ro	m l	NASA)						
		[/]	[]		[]	[]	(AI	[DD/I] ELE	TE)
						IONAL	E:	(I	f a	pŗ	11	.cal				JATE JATE]	
	ARD	MA	NI	FOLD	IS	OLATI										BY IC			
CHANG	GE]	ĹΝ	CI	RCUI'	rry	. SE	E	ASS.	ESS:	ΜE	IN:	'II	os FF	CS	5 1]	L001X-	-110)79X	•

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-702 05-6KF-2	128A-1		NASA DATA BASELINE NEW					
SUBSYSTEM: MDAC ID:	FRCS								
LEAD ANALYST:	D. HARTM	AN							
ASSESSMENT:									
CRITICAL FLIGH		REDUNDAN	CY SCREENS	S	CIL ITEM				
	NC .	A	В	С	LIEM				
NASA [3 /1R IOA [2 /1R] [P] [P] [P] [P] [P] P]	[x] *				
COMPARE [N /] [] [] []	[N]				
RECOMMENDATIONS:	(If di	fferent	from NASA)					
[2 /1R] [P] [P] [P] (A)	[A] DD/DELETE)				
* CIL RETENTION	RATIONALE	: (If ap		ADEQUATE NADEQUATE	[]				
REMARKS: LOSE CAPABILITY TO OPEN ISOLATION VALVE. THIS, COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE INABILITY TO EXPEL PROPELLANTS TO MEET CG LIMITS.									
	SUE IS TIED TO THE IOA HARDWARE CRITICALITY FOR THE FAILED OSED MANIFOLD 1-4 ISOLATION VALVE.								

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-70: 05-6KF-	3 2128A-2		NASA DATA BASELINE NEW	: [] / [x]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 703 RELAY			M	
LEAD ANALYST:	D. HARTI	MAN			
ASSESSMENT:					
CRITICAL: FLIGH		REDUNDA	NCY SCREE	NS	CIL ITEM
	NC	A	В	C	
NASA [2 /1R IOA [3 /3] [P]	[F] []	[P] []	[X] * []
COMPARE [N /N] [и ј	[и]	[N]	[N]
RECOMMENDATIONS:	(If d	ifferent	from NAS	A)	
[3 /1R] [P]	[F]	[P] (A	[A] .DD/DELETE)
* CIL RETENTION D		·) ADEQUATE INADEQUATE	[]
REMARKS: NASA FMEA CONSIDER HIGH CREATES INAUTHE LOSS OF ALL INTRUSTER LEAK.	ERS MULT BILITY TO	IPLE FAI D CLOSE	THE VALVE	. THIS, CO	UPLED WITH
AT MEETING WITH S DISCUSSED. IT W	SUBSYSTER AS AGREEI	MANAGE D UPON T	R ON 1/20 HAT THE I	/88, NSTS 2 SSUE RAISED	2206 WAS ABOVE WAS

DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE

ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-704 05-6KF-2128	-1	NASA DATA BASELINE NEW	[]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 704 RELAY			
LEAD ANALYST:	D. HARTMAN			
ASSESSMENT:				
CRITICAL: FLIGH		UNDANCY SCREEN	S	CIL ITEM
HDW/FUI	NC A	В	С	
NASA [3 /1R IOA [3 /3] [AN]] [P]	[] *
COMPARE [/N] [N]	[и]	N]	[]
RECOMMENDATIONS:	(If diffe	rent from NASA)	
[/] []	. [] [[] OD/DELETE
* CIL RETENTION DE REMARKS:			ADEQUATE NADEQUATE	[]

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-70 05-6KF-	5 2128 - 2		NASA DATA BASELIN NE					
MDAC ID:	FRCS 705 RELAY								
LEAD ANALYST:	D. HART	MAN							
ASSESSMENT:					·				
CRITICAL FLIGH		REDUND	ANCY SCRI	EENS	CIL ITEM				
HDW/FU	NC	A	В	C .	e nati				
NASA [2 /1R IOA [2 /1R] [P] P]	[F] [P]	[P] [P]	[X] * [X]				
COMPARE [/] []	[N]	[]	[]				
RECOMMENDATIONS:	(If d	ifferen	t from NA	ASA)					
[2 /1R] [P]	[P]		[A] ADD/DELETE)				
* CIL RETENTION	RATIONAL	E: (If	applicabl	Le) ADEQUATE INADEQUATE					
EMARKS: ASA FMEA CONSIDERS MULTIPLE FAILURES. LOSE CAPABILITY TO OPEN THE VALVE. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE EDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS O MEET CG LIMITS.									

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DSCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE

ISSUE REMAINS OPEN.

1/29/88 FRCS-70 05-6KF-	6 2128A-1		NASA DATA BASELINE NEW	
FRCS 706 RELAY				
D. HART	MAN			
	REDUNDANC	CY SCREE	NS	CIL ITEM
•	A	В .	С	1154
] [P] [P] [P] P]	[P] [P]	[x] *
1 . [] []	[]	[N]
(If d	ifferent f	from NAS	A)	
] [P] [P]	[P]	[A] DD/DELETE)
RATIONAL	E: (If app			r 1
		:	INADEQUATE	
REDUNDA	NCY MAY CA			
	FRCS-700 05-6KF-1 FRCS 706 RELAY D. HARTI ITY T NC] [[] [] CRATIONALI TO OPEN REDUNDAL	FRCS-706 05-6KF-2128A-1 FRCS 706 RELAY D. HARTMAN ITY REDUNDANCY NC A [P] [P] [] [(If different in a company of the	FRCS-706 05-6KF-2128A-1 FRCS 706 RELAY D. HARTMAN ITY REDUNDANCY SCREEN TO A B [P] [P] [P] [P] [P] [P] [P] [P] [P] [P] RATIONALE: (If applicable) TO OPEN ISOLATION VALVE. REDUNDANCY MAY CAUSE INAM	FRCS-706 05-6KF-2128A-1 FRCS 706 RELAY D. HARTMAN ITY REDUNDANCY SCREENS T NC A B C [P] [P] [P] [P] [P] [P] [P] (If different from NASA) [P] [P] [P] [P] (AFTIONALE: (If applicable) ADEQUATE INADEQUATE TO OPEN ISOLATION VALVE. THIS, COUPEREDUNDANCY MAY CAUSE INABILITY TO EX

ISSUE IS TIED TO THE IOA HARDWARE CRITICALITY FOR THE FAILED CLOSED MANIFOLD 1-4 ISOLATION VALVE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-707 05-6KF-21	L28A-2		NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID:	FRCS 707 RELAY				
LEAD ANALYST:	D. HARTMA	\N			
ASSESSMENT:					
CRITICAL: FLIGH	ITY R	REDUNDANC	Y SCREENS	3	CIL ITEM
	NC A		В	C	
NASA [2 /1R IOA [3 /3] [P) [F] [P]	[X] *
COMPARE [N /N] <u> </u>	[]	и] [и]	[N]
RECOMMENDATIONS:	(If dif	ferent f	rom NASA)		
[3 /1R] [`P	·] [:	F] [P] (AI	[A] DD/DELETE)
* CIL RETENTION	RATIONALE:	(If app		ADEQUATE IADEQUATE	
REMARKS: NASA FMEA CONSIDER HIGH CREATES INAUTHE LOSS OF ALL INTRUSTER LEAK.	BILITY TO	CLOSE TH	E VALVE.	THIS, COL	JPLED WITH
AT MEETING WITH	CIIBCVCTEM	MANAGER (กม 1/20/8		

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	NT ID:	1/29/8 FRCS-7 05-6KF	08	28 -1	NASA DATA: BASELINE [] NEW [X]						
SUBSYSTE MDAC ID:	M:	FRCS 708 RELAY									
LEAD ANALYST: D. HARTMAN											
ASSESSME	NT:										
	r			ANCY SCI		CIL ITEM					
	HDW/FU	NC	A		В	С					
NASA IOA	[3 /1R [3 /3]	[P]	[AN] []	[P] []	[[] *			
COMPARE	[/N	3	[N]	[N]	[14]	[]			
RECOMMEN	DATIONS:	(If	dif	feren	t from 1	NASA)					
	[/	3	[]	[]	[]	[(ADD/DE] ELETE			
* CIL RE	TENTION	RATIONA	LE:	(If	applical	ole) ADEQUAT INADEQUAT]			
IOA AGRE	ES WITH	NASA FM	EA.								

ASSESSMENT DAY ASSESSMENT ID NASA FMEA #:	: FRCS-709	9	NASA DATA: BASELINE [] NEW [X]					
SUBSYSTEM: MDAC ID: ITEM:	FRCS 709 RELAY							
LEAD ANALYST:	D. HARTI	MAN .						
ASSESSMENT:								
	CALITY IGHT	REDUNDANC	Y SCREENS	3	CIL ITEM			
	/FUNC	A	В	C				
NASA [2 ,	/1R] [/1R] [P] [P] [F] [P] [P] P]	[X] *			
COMPARE [/] [] [N] []	[]			
RECOMMENDATIO	NS: (If d	ifferent f	from NASA)					
[2 ,	/1R] [P] [P] [[A] DD/DELETE)			
* CIL RETENTION	ON RATIONALI	E: (If app	· 	ADEQUATE IADEQUATE				
REMARKS: NASA FMEA CONSTHE VALVE. TO REDUNDANCY MATO MEET CG LIS	HIS, COUPLEI Y CAUSE LOSS	O WITH THE	LOSS OF	ALL HARDW	ARE			
AT MEETING WI	TH SUBSYSTEM	MANAGER	ON 1/20/8	88. NSTS 2:	2206 WAS			

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-710	BASELIN	NASA DATA: BASELINE [] NEW [X]						
SUBSYSTEM: MDAC ID: ITEM:	FRCS 710 RELAY	710							
LEAD ANALYST:									
ASSESSMENT:									
CRITICA FLIG		NDANCY SCREENS	CIL ITEM						
HDW/F		В С							
NASA [3 /11 IOA [2 /11	[P] [P]	[P] [P] [P] [P]	[x] *						
COMPARE [N /] []	[] []	[N]						
RECOMMENDATIONS	(If differe	ent from NASA)	,						
[2 /1]	[P]	[P] [P]	[A] (ADD/DELETE)						
* CIL RETENTION	RATIONALE: (I	ADEQUATI							
INADEQUATE [] REMARKS: LOSE CAPABILITY TO OPEN ISOLATION VALVE. THIS, COUPLED WITH THE LOSS OF HARDWARE REDUNDANCY MAY CAUSE INABILITY TO EXPEL PROPELLANTS TO MEET CG LIMITS.									

ISSUE IS TIED TO THE IOA HARDWARE CRITICALITY FOR THE FAILED CLOSED MANIFOLD 1-4 ISOLATION VALVE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-71: 05-6KF-	1 2128A-2		NASA DATA: BASELINE [] NEW [X]					
SUBSYSTEM: MDAC ID:									
LEAD ANALYST:	D. HARTI	MAN							
ASSESSMENT:									
CRITICAL FLIGH		TY REDUNDANCY SCREENS							
	ИС	A	В	C	ITEM				
NASA [2 /1R IOA [3 /3] [P]	[F] []	[P] []	[X] *				
COMPARE [N /N] [N]	[и]	[N]	[N]				
RECOMMENDATIONS:	(If d	ifferent	from NAS	SA)					
[3 /1R] [P]	[F]	[P] (A)	[A] DD/DELETE)				
* CIL RETENTION	RATIONAL	E: (If a	pplicable	ADEQUATE INADEQUATE					
REMARKS: NASA FMEA CONSIDE HIGH CREATES INA THE LOSS OF ALL THRUSTER LEAK.	BILITY TO	CLOSE	THE VALVE	OWEVER, RELA	AY FAILING UPLED WITH				
AT MEETING WITH DISCUSSED. IT W	SUBSYSTEI AS AGREEI	MANAGE D UPON T	R ON 1/20 HAT THE I	/88, NSTS 22	2206 WAS ABOVE WAS				

DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE

ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		28 -1		NASA DATA BASELINE NEW	•				
	FRCS 712 RELAY								
LEAD ANALYST:	T: D. HARTMAN								
ASSESSMENT:									
CRITICAL: FLIGH		EDUND?	ENS	CIL ITEM					
HDW/FU	NC A		В	С					
NASA [3 /1R IOA [3 /3] [P]	[NA] .	[P] []	[] *				
COMPARE [/N] [N]	[N]	[N]	[]				
RECOMMENDATIONS:	(If dif	ferent	from NAS	SA)					
[/] []	[] .	[] (A	[] DD/DELETE)				
* CIL RETENTION I		(If a	applicable	ADEQUATE					
IOA AGREES WITH 1	NASA FMEA.								

ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-713 NASA FMEA #: 05-6KF-2128 -2 NASA DATA: BASELINE [] NEW [X]									
SUBSYSTEM: FRCS MDAC ID: 713 ITEM: RELAY									
LEAD ANALYST: D. HARTMAN									
ASSESSMENT:									
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C									
NASA [2 /1R] [P] [F] [P] [X] * IOA [2 /1R] [P] [P] [X]									
COMPARE [/] [] [N] []									
RECOMMENDATIONS: (If different from NASA)									
[2/1R] [P] [P] [A] (ADD/DELETE)									
* CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []									
REMARKS: NASA FMEA CONSIDERS MULTIPLE FAILURES. LOSE CAPABILITY TO OPEN THE VALVE. THIS, COUPLED WITH THE LOSS OF ALL HARDWARE REDUNDANCY MAY CAUSE LOSS OF JETS REQUIRED TO EXPEL PROPELLANTS TO MEET CG LIMITS.									
AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS									

DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE

ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-714 05-6KF-2	4 2128A-1		NASA DATA: BASELINE NEW	
MDAC ID:	FRCS 714 RELAY				
LEAD ANALYST:	D. HART	MAN	• • •		
ASSESSMENT:					•
		REDUNDA	NCY SCREENS	CIL ITEM	
FLIGH HDW/FU	NC	A	В	С	4.44.
NASA [3 /1R IOA [2 /1R] [P] P]	[P] [[P] [P] P]	[x] *
COMPARE [N /] []	[] []	[N]
RECOMMENDATIONS:	(If d	ifferent	from NASA)	
[2 /1R] [P]	[P] [P] (A	[A] DD/DELETE)
* CIL RETENTION	RATIONAL	E: (If a	applicable)	ADEQUATE NADEQUATE	[]
REMARKS: LOSE CAPABILITY LOSS OF HARDWARE PROPELLANTS TO M	REDUNDA	NCY MAY	ON VALVE.	THIS, COUP	LED WITH THE
ISSUE IS TIED TO	THE IOA	A HARDWA	RE CRITICAL	ITY FOR TH	E FAILED

CLOSED MANIFOLD 1-4 ISOLATION VALVE.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-71 05-6KF-	.5 2128A-2		NASA DATA: BASELINE [] NEW [X]					
SUBSYSTEM: MDAC ID:	FRCS 715 RELAY								
LEAD ANALYST:	D. HART	MAN							
ASSESSMENT:			•						
CRITICAL FLIGH		REDUNDA	ANCY SCRE	ENS	CIL ITEM				
HDW/FUI		A	В	С	IIEH				
NASA [2 /1R IOA [3 /3] [P]	[F] []	[P] []	[X] * []				
COMPARE [N /N] [N]	[N]	[N]	[N]				
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)					
[3 /1R] [P]	[F]		[A] ADD/DELETE)				
* CIL RETENTION F	RATIONAL	E: (If a	pplicable	e) ADEQUATE INADEQUATE	[]				
REMARKS: NASA FMEA CONSIDE	RS MITTE	דמה הוסד.	TIIDEC T		-				
HIGH CREATES INAF THE LOSS OF ALL H THRUSTER LEAK.	BILITY TO	CLOSE	THE VALVI	E. THIS. CO	OUPLED WITH				

AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88, NSTS 22206 WAS DISCUSSED. IT WAS AGREED UPON THAT THE ISSUE RAISED ABOVE WAS DUE TO DIFFERENT INTERPRETATIONS OF NSTS 22206. THEREFORE, THE ISSUE REMAINS OPEN.

ASSESSME ASSESSME NASA FME	NT I		FRCS-	/29/88 RCS-716 5-6KF-2128 -1				NASA DATA: BASELINE [] NEW [X]								
SUBSYSTE MDAC ID:	M:		FRCS 716 RELAY	i												
LEAD ANA	LYST	:	D. HA	RTM	[A]	1										
ASSESSME	NT:															
	CRITI FI	CAL:			RI	EDUNI	DANC	CY	SCR	EENS	S			CI		
	HDV	/FUI	NC .		A			В			C			. = = -		
NASA IOA	[3 [3	/1R /3]	[P]	[[NA]	[P]		[[]	*
COMPARE	[/N]	[N]	[N]	ſ	N]		[]	
RECOMMEN	DATIC	ns:	(If	di	ff	ere	nt f	rc	m N2	ASA))					
	[/]	[]	[]	[]	(AI	[D/I) DELI	ETE
* CIL RE	TENTI	ON F	RATION	ALE	:	(If	app	li	.cab]			EQUAT		[]	
REMARKS:	ES WT	THE N	IASA E	WE A						IN		EQUAT		[]	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-71 05-6KF-2	7 2128 - 2		BASELIN	NASA DATA: BASELINE [] NEW [X]			
SUBSYSTEM: MDAC ID:	FRCS							
LEAD ANALYST:	D. HARTI	MAN						
ASSESSMENT:					2 · · · · · · · · · · · · · · · · · · ·			
CRITICAL	ITY	REDUNDAN	CY SCRE	ENS	CIL ITEM			
FLIGH HDW/FU	NC	A	В	С				
NASA [2 /1R IOA [2 /1R] [P] [P] [F] P]	[P] [P]	[X] * [X]			
COMPARE [/] [) [и]	[]	[]			
RECOMMENDATIONS:	(If d	ifferent	from NA	SA)				
[2 /1R	.] [P] (P]	[P]	[A] [ADD/DELETE)			
* CIL RETENTION	RATIONAL	E: (If ar	plicabl	.e) ADEQUATE INADEQUATE				
REMARKS: NASA FMEA CONSIDER THE VALVE. THIS REDUNDANCY MAY OF TO MEET CG LIMIT	S, COUPLE CAUSE LOS	D WITH TH	IE LOSS	LOSE CAPABI	LITY TO OPEN WARE			
AT MEETING WITH DISCUSSED. IT V DUE TO DIFFERENT	VAS AGREE	D UPON TH	IAT THE	ISSUE RAISE	ID ABOVE WAS			

ISSUE REMAINS OPEN.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-718 05-6KF-2	8 2089 - 1		NASA DATA BASELINE NEW				
SUBSYSTEM:	FRCS 718	FRCS						
LEAD ANALYST: D. HARTMAN								
ASSESSMENT:								
CRITICAL: FLIGH		REDUNDAN	CY SCREE	ins	CIL ITEM			
HDW/FUI	NC	A	В	С	TIEM			
NASA [2 /1R IOA [3 /3] [P] [F]	[P] []	[X] * []			
COMPARE [N /N] [и] [n j	[N]	[и]			
RECOMMENDATIONS:	(If d	ifferent	from NAS	SA)				
[3 /2R] [P] [P]	[P] (A	[D] DD/DELETE)			
* CIL RETENTION	RATIONAL	E: (If ap	plicable	e) ADEQUATE INADEQUATE	[]			
REMARKS: NASA FMEA CONSIDE CAPABILITY TO MODE THE VALVE CLOSED	NITOR VA	LVE STATU	S MAY LE	OWEVER, LOS	S OF LY FAILING			
AT MEETING WITH S DISCUSSED. IT WE DUE TO DIFFERENT ISSUE REMAINS OP	AS AGREE! INTERPR	D UPON TH	AT THE I	SSUE RAISED	ABOVE WAS			

ASSESSME NASA FME	NT I	D:	FRCS-	1/29/88 FRCS-719 05-6KF-2089 -2				BASELINE [] NEW [X]						
SUBSYSTE MDAC ID: ITEM:			FRCS 719 RESIS	TOR,	1.2	K 2W								
LEAD ANA	LYST	!:	D. HA	RTM	AN									
ASSESSME	:TM													
	ITY	TY REDUNDANCY SCREENS						CIL ITEM						
		LIGH W/FU		I	1	I	3	(2		214			
NASA IOA	[3	/3 /3]]]	[[]]]	[]	*		
COMPARE	[/]	[]	[]	[]	[]			
RECOMMEN	DATI	ons:	(If	dif	fere	nt fi	com N	ASA)						
	[/]	[]	[]	. [] ([ADD/I) DELE	TE)		
* CIL RE	TENT	ON :	RATION	ALE:	(If	app]	icab	7	ADEQUATE ADEQUATE	•]			
REMARKS:	RENC	ES.							Z , ~ * * * * *		ı			

SUBSYSTEM: FRCS MDAC ID: 720 ITEM: RESISTOR, 5.1K 1/4W LEAD ANALYST: D. HARTMAN ASSESSMENT: CRITICALITY REDUNDANCY SCREENS CIL FLIGHT HDW/FUNC A B C NASA [3 /3] [] [] [] [] * IOA [3 /3] [] [] [] [] * COMPARE [/] [] [] [] [] [] * RECOMMENDATIONS: (If different from NASA) [/] [] [] [] [] [] [] * ** CIL RETENTION RATIONALE: (If applicable) REMARKS:	ASSESSME ASSESSME NASA FME	NT ID:	: F	./29/88 RCS-72 5-6KF-	0	-1	NASA DATA: BASELINE [] NEW [X]						
ASSESSMENT: CRITICALITY REDUNDANCY SCREENS CIL ITEM	MDAC ID:	M:	7	20)R, 5.	1K 1/4	W						
CRITICALITY FLIGHT HDW/FUNC A B C NASA [3 /3] [] [] [] [] * IOA [3 /3] [] [] [] [] [] * COMPARE [/] [] [] [] [] [] [] * RECOMMENDATIONS: (If different from NASA) [/] [] [] [] [] [] [] (ADD/DELETE) * CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []	LEAD ANA	LYST:	E	. HART	MAN								
FLIGHT HDW/FUNC A B C	ASSESSME	NT:											
NASA [3 /3] [] [] [] [] * IOA [3 /3] [] [] [] [] COMPARE [/] [] [] [] [] RECOMMENDATIONS: (If different from NASA) [/] [] [] [] [] [] * CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []		FL:	IGHT						• • •				
COMPARE [/] [] [] [] [] RECOMMENDATIONS: (If different from NASA) [/] [] [] [] [] [] [] [] [] [HDW,	FUNC	;	A	В		C					
RECOMMENDATIONS: (If different from NASA) [/] [] [] [] [] (ADD/DELETE) * CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []	NASA IOA	[3 ,	/3] /3]) ([]	[]]]	*	
[/] [] [] [] (ADD/DELETE) * CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []	COMPARE	[,	/]	(]	[]	[]	[]		
(ADD/DELETE) * CIL RETENTION RATIONALE: (If applicable) ADEQUATE [] INADEQUATE []	RECOMMEN	DATIO	NS:	(If d	liffer	ent fr	om NAS	SA)					
ADEQUATE [] INADEQUATE []		[/	/]	(]	(]	[] ([(ADD/] DEL	ETE	
		TENTI(ON RA	TIONAI	Œ: (I	f appl	icable	AI	-	_]		

NO DIFFERENCES.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 NASA DATA: FRCS-721 BASELINE [] 05-6KF-2087 -1 NEW [X]												
SUBSYSTEM: MDAC ID: ITEM:	FRCS 721 RESISTOR,												
LEAD ANALYST: D. HARTMAN													
ASSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C													
NASA [3 /3 IOA [3 /3] []	[]]]	[] *					
COMPARE [/] []	[]	[]	[]					
RECOMMENDATIONS:	(If dif	feren	t fr	om NA	5 A)								
. [/] [1 .	[. 1	[] (] DELETE)					
* CIL RETENTION I	RATIONALE:	(If	appl	icabl	A	DEQUATE DEQUATE]					
REMARKS: A SHORT ACROSS A RLR TYPE RESISTOR IS NOT A CREDIBLE FAILURE. IOA RECOMMENDS REMOVAL OF THE "SHORT" FAILURE MODE FROM THIS FMEA.													
	SSUE RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88 SHORT FAILURE MODE TO BE REMOVED).												

ASSESSME ASSESSME			•	9/88 5 - 722				1	IASA L BASEI			1	
NASA FME					87 -	-1					к j	: j	
SUBSYSTE MDAC ID:			FRCS 722 RESI	S ISTOR,	5.1	.K 1/4	W						
LEAD ANA	LYST	:	D. I	HARTMAI	N								
ASSESSME	:TN												
		ICAL LIGH	YTI	R	EDUN	IDANCY	SCR	EENS			CII		
	_	W/FU		A		В		(2		111	111	
NASA IOA	[3 [3	/3 /3]	[]]]	[]		. []	*
COMPARE	[/]	[]	[]	[]		[]	
RECOMMEN	DATI	ons:	(:	If dif	fere	ent fr	om N	ASA)					
	[/]	[]	[]	[]	(A	[DD/D] ELE	TE.
* CIL RE		ION	RATIO	ONALE:	(If	appl	icab	1	ADEQUA		-]	
REMARKS:		ES.											

ASSESSMI ASSESSMI NASA FMI	ENT ENT EA	D. I: #:	ATE: D:	1/2 FRO 05-	1/29/88 NASA DATA: FRCS-723 BASELINE 05-6KF-2087 -1 NEW						[]			
SUBSYSTI MDAC ID: ITEM:	EM:			FR0	es B			K 1/4					-	£	
LEAD AND	AĻY	ST	:	D.	HAR	rman	1								
ASSESSMI	ENT	:													
	CR		ICAL LIGH			RE	EDUN	DANCY	s	CREEN			CII		
	1		W/FU			A		В			С			11.1	
NASA IOA	[3	/3 /3]		[]	[]]]]]	*
COMPARE	[/]		Ţ.]	[]	[]		[3	
RECOMMEN	NDA!	ri(ons:	((If o	diff	ere	nt fr	om	NASA)				
	[/]		[]	[]	[]	(A)] DELE	ETE)
* CIL RI						LE:	(If	appl	ica		ADEQU NADEQU	JATE JATE	[]	
REMARKS: A SHORT IOA RECO FMEA.	AC	RO:	SS A	RLF	YTY										
ISSUE RE									YSI	гем м	ANAGEF	ON :	1/20	/88	3

NASA DATA:

ASSESSMENT DATE: 1/29/88

ASSESSMENT ID: NASA FMEA #:	FRCS-724 05-6KF-2088	-1	BASELII NI	NÉ [] EW [X]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 724 RESISTOR, 5.			
LEAD ANALYST:	D. HARTMAN		· -	
ASSESSMENT:				
FLIGH	ITY REDU T NC A	INDANCY SCRI B	EENS C	CIL ITEM
NASA [3 /3 IOA [3 /3				[] *
COMPARE [/] []	[]	[]	[]
RECOMMENDATIONS:	(If differ	ent from N	ASA)	
[3 /2R] [P]	[P]	[P] .	[] (ADD/DELETE)
* CIL RETENTION	RATIONALE: (I	f applicab	le) ADEQUATE INADEQUATE	E []
REMARKS: THIS FAILURE MAY POSITION. REDUN TO FALSELY FAILI OPERATIONS.	DANCY PROVIDE	D. LOSS OF	F ALL REDUND	DANCY MAY LEAD
ISSUE NOT RESOLV	ED AT MEETING	WITH SUBSY	STEM MANAGE	R ON 1/20/88.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:								•					
	FRCS 725 RESISTOR	R, 5.1K	1/4%	7									
LEAD ANALYST:	D. HARTI	MAN											
ASSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM													
HDW/FU		A	В		С			•					
NASA [3 /3 IOA [3 /3] []	[]	[]	[[] *					
COMPARE [/] []	[]	[]	[]					
RECOMMENDATIONS:	(If d	ifferent	fro	om NAS	A)								
[/] []	[]	[] (2	[ADD/DI] ELETE)					
* CIL RETENTION	RATIONAL	E: (If a	ppli	icable	AI	DEQUATE DEQUATE]					
REMARKS: A SHORT ACROSS A IOA RECOMMENDS R FMEA.	A SHORT ACROSS A RLR TYPE RESISTOR IS NOT A CREDIBLE FAILURE. TOA RECOMMENDS REMOVAL OF THE "SHORT" FAILURE MODE FROM THIS												
ISSUE RESOLVED A	SSUE RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88												

(SHORT FAILURE MODE TO BE REMOVED).

ASSESSME ASSESSME NASA FME	NT NT A	D I #:	ATE: D:	1/29/3 FRCS- 05-6K	1/29/88 NASA DATA: FRCS-726 BASELINE [] 05-6KF-2088 -1 NEW [X]								
SUBSYSTE MDAC ID:	T. T. +			FRCS 726 RESIS									
LEAD ANA	LY	ST	:	D. HAI	RTMA	N							
ASSESSMENT:													
CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C													
NASA IOA	[3 3	/3 /3]	[]	[]	[]	[] *	
COMPARE	[/]	[]	[]	[]	[)	
RECOMMEN	DA'	TI:	ons:	(If	dif	feren	t fr	om NA	SA)				
	[3	/2R]	[P]	[P]	[P] /DELET	E)
* CIL RE	TE	NT:	ION 1	RATION	ALE:	(If	appl	icabl	A	DEQUATI DEQUATI]	
THIS FAI POSITION TO FALSE	THIS FAILURE MAY CAUSE LOSS OF ACCURATE INDICATION OF THE VALVE POSITION. REDUNDANCY PROVIDED. LOSS OF ALL REDUNDANCY MAY LEAD TO FALSELY FAILING THE VALVE CLOSED, POSSIBLY EFFECTING MISSION OPERATIONS.												
ISSUE NO	T I	RE:	SOLVI	ED AT N	1EET	ING W	ITH	SUBSY	STEM	MANAGI	R OI	1/20	/88.

ASSESSMI ASSESSMI NASA FMI	ENT	I	D:	1/2 FRO	29/88 CS-72 -6KF-	7 2088	-1		_		DATA ELINE NEW	[]	
SUBSYSTI MDAC ID: ITEM:				FR0	CS 7		1K 1/4							
LEAD ANA	ALY	ST	:	D.	HART	MAN				-				-
ASSESSMI	ENT	:												
		F	LIGH			REDU A	ndancy B		REENS C			CII		
NASA IOA	[3	/3 /3]	[]	[]	[]		[] *]	
COMPARE	[/	1	[]	[]	[]		[]	
RECOMME	NDA'	TI	ons:	:	(If d	iffer	ent fr	om	NASA)					
	[/	3	(]	ľ]	[]	(A] DELET	E)
* CIL R		ΝŢ	ION	RAT	IONAL	E: (I	f appl	ica	A		JATE JATE	[]	
REMARKS A SHORT IOA REC FMEA.	AC	RO EN	SS 1 DS 1	A RLI REMO	R TYP VAL O	E RES	ISTOR "SHOR	IS T"	NOT A FAILUR	CREI E M	DIBLE DDE F	FA]	LURE THIS	•
ISSUE R								YSI	EM MAN	AGE	R ON	1/20	0/88	

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-728	3 - 1		ASA DATA: BASELINE NEW]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 728 RESISTOR,	5.1K 1/4W	1		who date	
LEAD ANALYST:	D. HARTMAN		•	-		
ASSESSMENT:		•				
CRITICAL: FLIGHT HDW/FUI		DUNDANCY B	SCREENS C		CIL	
NASA [3 /3 IOA [3 /3] [] [] []	[] *
COMPARE [/	1 t :] [] []	[]
RECOMMENDATIONS:	(If diffe	erent fro	om NASA)			
[/,] []] [] [[[D/DC] ELETE)
* CIL RETENTION I	RATIONALE:	(If appli	A	DEQUATE DEQUATE	[]
REMARKS: A SHORT ACROSS A IOA RECOMMENDS RI FMEA.						
ISSUE RESOLVED AT			STEM MAN	AGER ON :	1/20,	/88

ASSESSMENT DATE: 1/29/8 ASSESSMENT ID: FRCS-7 NASA FMEA #: 05-6KF						88 - 1				ASA DATA BASELINE NEW]
SUBSYSTE MDAC ID: ITEM:	7.7 •			FRCS 729 RESIS								
LEAD ANA	LY	ST	:	D. HAI	RTMA	N						
ASSESSME	NT	:										
	CRITICALITY REDUNDANCY SCREENS CIL FLIGHT ITEM HDW/FUNC A B C											
	1	HD	W/FUI	1C	A	•	В		С			
NASA IOA	[3 3	/3 /3]	[]	[]	[]	[] *]
COMPARE	[/	1	[]	[]	[]	[]
RECOMMEN	'DA'	TI(ons:	(If	dif	feren	t fr	om NAS	SA)			
	[3	/2R]	[P]	[P]	[P] (A)	[DD/D] ELETE)
* CIL RE	TE	NT:	ION 1	RATION	ALE:	(If	appl	icable	Al	DEQUATE DEQUATE]
REMARKS: THIS FAI POSITION TO FALSE OPERATIO	LU LY	R. F.	EDUNI	DANCY I	PROV	IDED.	LO	SS OF	NDI ALL	CATION O	F TH	E VALVE MAY LEAD

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSMENT DATE: 1/29 ASSESSMENT ID: FRCS NASA FMEA #: 05-6	9/88 S-730 6KF-2088 -1	NASA DATA: BASELINE [] NEW [X]
MDAC ID: 730	S ISTOR, 5.1K 1/4W	
LEAD ANALYST: D. I	HARTMAN	
ASSESSMENT:		
CRITICALITY FLIGHT HDW/FUNC	REDUNDANCY SCRE	EENS CIL ITEM C
NASA [3 /3] IOA [3 /3]		[] [] *
COMPARE [/]	[] []	[]
RECOMMENDATIONS: (If different from NA	ASA)
[3 /2R]	[P] [P]	[P] [] (ADD/DELETE)
* CIL RETENTION RATIO	ONALE: (If applicabl	Le) ADEQUATE [] INADEQUATE []
POSITION. REDUNDANCY	Y PROVIDED. LOSS OF	INDICATION OF THE VALVE FALL REDUNDANCY MAY LEAD SSIBLY EFFECTING MISSION
ISSUE NOT RESOLVED AT	r MEETING WITH SUBSY	STEM MANAGER ON 1/20/88.

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	FRCS-731	88 -1				ASA DA BASELI 1	INE]
	FRCS 731 RESISTOR,	5.1K	1/41	N.					
LEAD ANALYST:	D. HARTMA	N							
ASSESSMENT:									
FLIGH:		EDUND		SCRE	ENS C			CIL	
HDW/FUI					•				
NASA [3 /3 IOA [3 /3] []	[]	[]		[]
COMPARE [/] []	[]	[]		[]
RECOMMENDATIONS:	(If dif	feren	t fr	om NA	SA)				
[/] []	C]	[1	(AI	[DD/D] ELETE)
* CIL RETENTION	RATIONALE:	(If	appl	icabl	A)	DEQUA:	ľΕ	[]
REMARKS: A SHORT ACROSS A IOA RECOMMENDS R FMEA.	RLR TYPE EMOVAL OF	RESIS THE "	TOR SHOR	IS NO' I" FA	r a (CREDII	BLE E FI	FAI ROM	LURE. THIS
ISSUE RESOLVED A	T MEETING	WITH	SUBS	YSTEM	MAN	AGER (ON 1	L/20	/88

(SHORT FAILURE MODE TO BE REMOVED).

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-732 05-6KF-2	2 2089 - 1			NASA DATA BASELINE NEW	
SUBSYSTEM: MDAC ID:	FRCS 732 RESISTOR					
LEAD ANALYST:	D. HARTM	IAN		i germen	t e	
ASSESSMENT:						
CRITICAL: FLIGHT HDW/FUI	ITY F	REDUNDA	NCY	SCREENS	5	CIL ITEM
HDW/FUI	NC	A	В		С	
NASA [2 /1R IOA [3 /3] [P]	[F [] [P]	[X] *
COMPARE [N /N] [N]	[N] [N]	[N]
RECOMMENDATIONS:	(If di	fferent	fro	om NASA)	
[3 /2R] [P]	[P] [P] (A	[D] DD/DELETE)
* CIL RETENTION 1	RATIONALE	E: (If a	ppli		ADEQUATE NADEQUATE	[]
REMARKS: NASA FMEA CONSIDE CAPABILITY TO MODE THE VALVE CLOSED	NITOR VAI	LVE STAT	US M	ES. HOV	WEVER, LOS D TO FALSE	S OF LY FAILING
AT MEETING WITH S DISCUSSED. IT WE DUE TO DIFFERENT ISSUE REMAINS OP	AS AGREEI INTERPRE	UPON T	'HAT	THE IS	SUE RAISED	ABOVE WAS

ASSESSMEN ASSESSMEN NASA FMEA	T] #:	ID:	FRC 05-	S-733 6KF-208	39 –	2	NASA DATA: BASELINE [] NEW [X]					
SUBSYSTEM MDAC ID: ITEM:			FRC 733 RES		1.2	K 2W						
LEAD ANAL	YST	Γ:	D. 1	HARTMAI	1							
ASSESSMEN	T:											
CRITICALITY REDUNDANCY SCREENS FLIGHT										CIL ITEM		
***	_		JNC	A		E	3		С		1 111	
NASA IOA	[3	3 /3]	[]	[]] []	*
COMPARE	[/]	[]	[]	[]	[]	
RECOMMEND	AT]	CONS	: (If diff	ere	nt fr	om N	IASA)				
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SUBSYSTE MDAC ID:	M:		FRCS 734 RESIS	TOR,	5.1	K 1/4	W						
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ASSESSMENT ASSESSMENT NASA FMEA #	DATE: ID: :	1/29/8 FRCS-1 05-6KI	38 735 F-208	37 -1				ASA DATA BASELINE NEW]
SUBSYSTEM: MDAC ID: ITEM:		FRCS 735 RESIST								
LEAD ANALYS	T:	D. HAI	RTMAI	1						
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SUBSYSTE MDAC ID:			FRCS 736 RESI	S ISTOR,	5.1	K 1/4	W					
LEAD ANA	LYSI	?:	D. H	IARTMA	N							
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REMARKS:		ES.										

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:	1/29/88 FRCS-737 05-6KF-20	87 -1				ASA DATA BASELINE NEW]
SUBSYSTEM: MDAC ID: ITEM:	FRCS 737 RESISTOR,							
LEAD ANALYST:	D. HARTMA	N						
ASSESSMENT:								
CRITICAL: FLIGH HDW/FU			ANCY B	SCREE	ENS C		CIL	
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ISSUE RESOLVED A				YSTEM	MANZ	AGER ON	1/20,	/88

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #:		1	NASA DAT BASELIN NI							
SUBSYSTEM:	FRCS 738	FRCS								
LEAD ANALYST:	D. HARTMAN									
ASSESSMENT:										
CRITICALI FLIGHT		DANCY SCRI	EENS	CIL ITEM						
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NASA [3 /3 IOA [3 /3] []	[]	[]	[] *						
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* CIL RETENTION I	RATIONALE: (If	applicab	le) ADEQUATI INADEQUATI							
REMARKS: THIS FAILURE MAY POSITION. REDUNI TO FALSELY FAILIN OPERATIONS.	DANCY PROVIDED	. LOSS O	INDICATION F ALL REDUNI	OF THE VALVE						

ISSUE NOT RESOLVED AT MEETING WITH SUBSYSTEM MANAGER ON 1/20/88.

ASSESSMENT DASSESSMENT IN NASA FMEA #:	ATE: D:	1/29/8 FRCS-7 05-6KI	38 739 F-208	88 - 1			ì	NASA DA BASELI N] K]	
SUBSYSTEM: MDAC ID: ITEM:		FRCS 739 RESIST									
LEAD ANALYST	:	D. HAI	RTMAI	N							
ASSESSMENT:											
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nD:	M/ FOI	NC.	A		Б		•	•			
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(SHORT FAILURE MODE TO BE REMOVED).

ASSESSMENT DATE: ASSESSMENT ID: NASA FMEA #: SUBSYSTEM:	1/29/88 FRCS-740 05-6KF-2088 -:	1	NASA DA' BASELII N							
SUBSYSTEM: MDAC ID: ITEM:	740									
LEAD ANALYST:	D. HARTMAN	•								
ASSESSMENT:										
CRITICAL FLIGH	ITY REDUNI T	DANCY SCRI	EENS	CIL ITEM						
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NASA [3 /3 IOA [3 /3] []	[]	[]	[] *						
COMPARE [/] []	[]	[]	[]						
RECOMMENDATIONS:	(If differe	nt from N	ASA)							
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* CIL RETENTION	RATIONALE: (If	applicab	le) ADEQUATI INADEQUATI							
REMARKS: THIS FAILURE MAY POSITION. REDUN TO FALSELY FAILI OPERATIONS.	DANCY PROVIDED	. LOSS O	F ALL REDUNI	DANCY MAY LEAD						
ISSUE NOT RESOLV	ED AT MEETING V	WITH SUBS	YSTEM MANAG	ER ON 1/20/88.						

A CORCCMI	ASSESSMENT DATE: 1/29/88 ASSESSMENT ID: FRCS-741 NASA FMEA #: 05-6KF-2088 -1								N		LINE NEW	[
SUBSYSTI MDAC ID: ITEM:	:			FRC 741 RES										
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ASSESSMI	ENT	:												
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NASA IOA	[3	/3 /3]].]	[]	[]		[]	*
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	[/]	[-]	[]	[]	(Al	[]] [) ELE	TE)
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REMARKS A SHORT IOA REC FMEA.	AC: OMM	RO:	SS A	A RLE REMOV	TYPE	RES:	ISTOR "SHOR	IS T"	NOT A	CREI	IBLE	FA]	LUR	E. S
ISSUE R	ESO FAI	LV LU	ED A	AT ME	ETING TO BE	WITI REM	H SUBS	rsy	EM MAN	IAGEF	ON :	1/20	/88	

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